

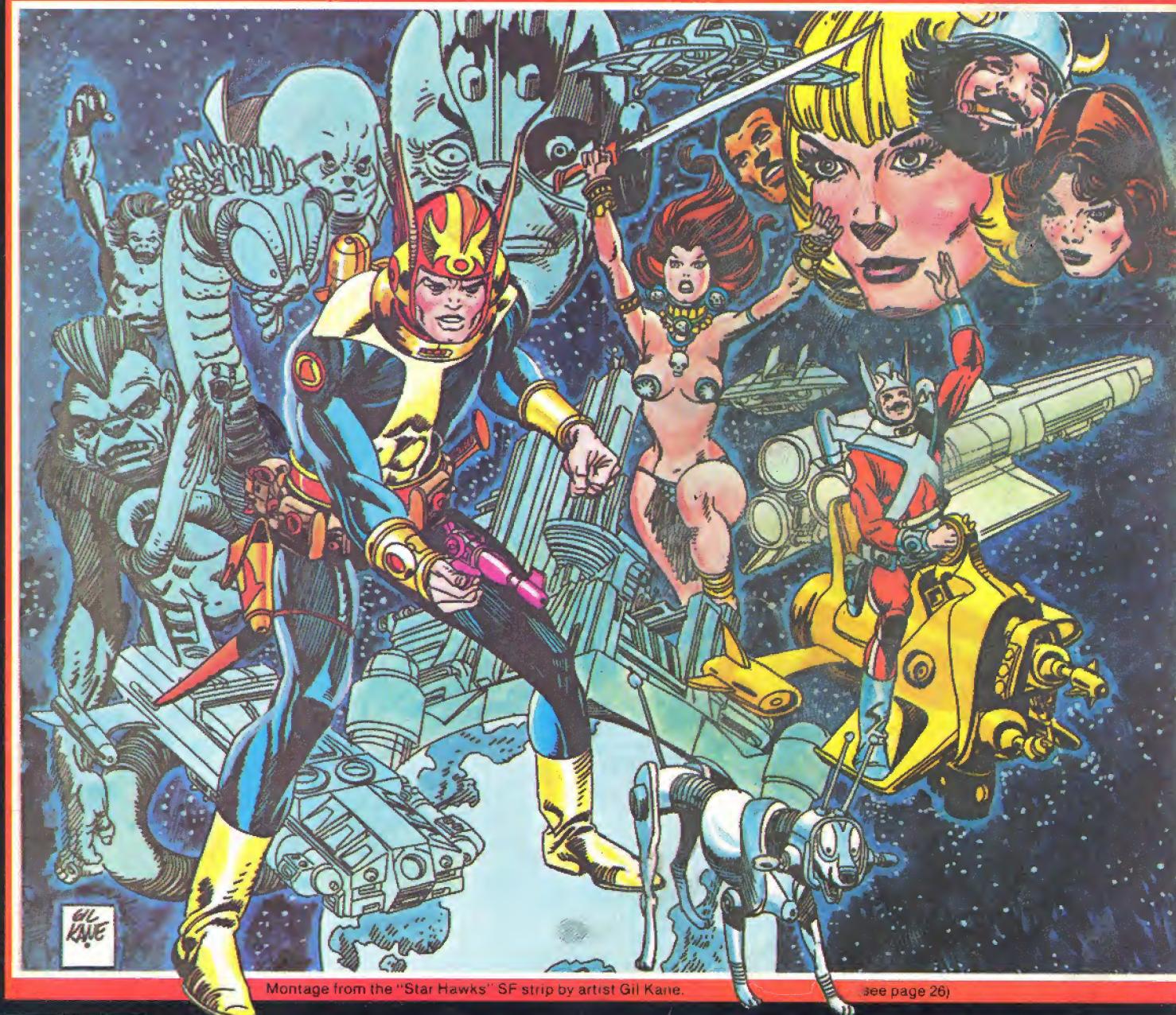
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Earth Invades The Solar System
(see page 36)

JANUARY 1979 #7

FUTURE

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Montage from the "Star Hawks" SF strip by artist Gil Kane.

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A.E. Van Vogt • Space Theater • The Brothers Hildebrandt
Charles Sheffield: Big Business In Orbit
New Laser Game • "Martian Chronicles" • SF Awards

Buck Rogers Comes To TV

THE MAGAZINE OF SCIENCE ADVENTURE

FUTURE

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ON THE COVER: An original Star Hawks panorama concocted by Hawks' co-creator Gil Kane. The Star Hawks are agents of the Interplanetary Law Service and operate out of a Service Satellite orbiting in the far off Barnum planetary system. Prominent in artist Kane's colorful rendering are Star Hawks' heroes Rex Jaxan (foreground) and Chavez (on small spacecraft). Also onboard are Canine robot agent Sniffer (foreground) and Chief ILS agent Alice K. Benyon, the blonde woman in the upper right hand corner of the portrait.

output

There are several magazines that feature science-fiction stories and articles. There are magazines that focus on astronomy, space and other sciences. But the unique character of FUTURE is that it brings these various worlds together into one magazine.

FUTURE melds science fiction to the real world—dreams to actualities. And never has there been a more dramatic example of this magnificent fusion than on pages 56-57 of this issue—the Getaway Special Contest.

Together with our sister magazine, STARLOG, we have made a down-payment reservation for a payload container aboard a shuttle flight scheduled within the next few years. We are offering this space, free, to any individual or group among our readers who can devise a worthwhile scientific experiment or space project of any kind that can be built within the NASA parameters.

Think of it: we are offering you the chance to reach into space with your own creative mind. This is literally the next best thing to being there in person (you'll have to wait a few more years for that opportunity).

Why, you may ask, is a publishing company doing something like this? After all, it's tremendously expensive and time-consuming. It won't sell more magazines. It won't produce a profit.

There are three reasons: first, it is our way of supporting the entrance of free enterprise into space activities (an important shift from government-controlled and financed space projects). Second, it is a real-life dramatization of the way in which FUTURE fuses *Buck Rogers* fiction with "nuts and bolts" reality.

Third, my partner and I are fascinated with the prospects of leaving this planet and exploring the opportunities of space. But we are not scientists (neither are most of our staff) and we cannot work directly in that field. However, we publish magazines that inspire people about the future, that offer some directions toward a better tomorrow and that bring the reality of space exploration right to our readers' doorsteps.

This is our way of being involved.

I spoke recently to the Bendix Corporation's Engineers' Club (a company heavily involved in space work), and I reminded them that their world of valves and connectors is responsible for building projects that probably had their roots in science-fiction visions. Both worlds need each other if we are to move into space.

That's why FUTURE covers these two worlds. That's why FUTURE, through articles, interviews, photos, art and projects like the Getaway Special Contest, is truly helping to propel the human race toward the stars.

Kerry O'Quinn/Publisher

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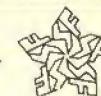


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(Continued from page 6)

BOVA VS. OOP



... In FUTURE #4, Ben Bova says, "And no one, absolutely no one, predicted that the first landing on the Moon would be televised to billions of goggle-eyed people back on Earth!" Bova should know better than to say *absolutely*. As the enclosed strips show, V. T. Hamlin, in his comic strip *Alley Oop*, predicted a televised

Moon landing in 1950. Not only did he make the prediction, he foresaw some of the consequences of that prediction, such as intrusive commercials and audience boredom. Now that's science fiction!

Rick Norwood
Lafayette, LA 70501

VIOLENCE IN SPACE

... When I was still rather young, I used to derive great fun from reading about space wars, the mean aliens getting the rough deal and so on. Then I grew up and I started thinking. Those people flying those beautiful machines are acting like cave people. They have hardly achieved anything. Your magazine is hardly a step forward. Ben Bova says war in space is a must; plenty of ads for miniature battle ships. I would like to think that people like Heinlein, Hal Clement, Reginald Brenton and others of the same kind say what they say just for money. The story where the aliens are bad, and that kind of stuff, sells well. But then, look at their backgrounds. A bunch of militarists delighting themselves with the thought of more violence, this time, wonder of wonders, on a galactic scale. I could say much more but I am sure I have made my point clear enough. Hoping for a

world where science, instead of giving us weapons, will give us a chance to elevate our spirits through a better understanding of ourselves and the Universe surrounding us, I wish the best to your magazine. It's never too late.

Giuseppe Albero
Monte Rio, CA 95462

TAXING

... I read your article on the Tax Revolt ("Output," FUTURE #5). It is very much appreciated that FUTURE has insight and enough concern about our country to publish a little bit about political policies that will affect our future lives.

Paul Wellmer
President and Director
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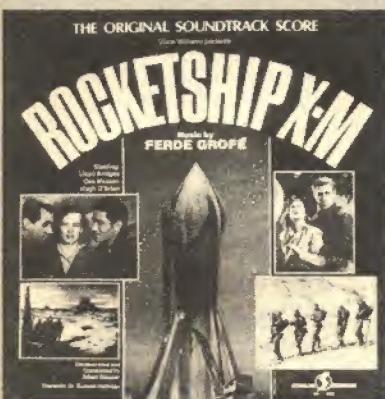
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IGUANA CON REPORT

The 36th World Science Fiction Convention, that annual gathering of science fiction and fantasy fans and writers from all over the world, descended upon Phoenix, Arizona, last Labor Day weekend. "IguanaCon" drew 6900 paid members, 4200 of whom attended, a record for WorldCon. They filled two huge hotels, the Hyatt Regency and the Adams, where they were able to take part in the traditional activities: art and masquerade shows, movies (including sneak previews of *Watership Down* and *Battlestar Galactica*), numerous panels featuring SF writers and artists and parties.

The guests of honor were famed fantasist Harlan Ellison and long-time fan Bill Bowers. Ellison added an extra dimension to the con by using a recreational vehicle as his base of operations (rather than a hotel suite) and spending as little money as possible in Phoenix in protest against Arizona's failure to pass the Equal Rights Amendment. He also spoke briefly on the subject during his many appearances, including his guest of honor speech Sunday evening.

But most fans weren't too concerned about Arizona and the ERA. They were at the con to celebrate the current popularity of SF and fantasy

— though one fan was heard to complain of being "overrun by neos" (new fans at their first convention).

Neos or not, they bought books and magazines in the huckster room and got them autographed at official sessions, or whenever a writer could be found loose in the halls. Many fans took the opportunity to don costumes, thus treating unsuspecting Phoenixians to a parade of characters from *Star Wars*, *Logan's Run* and other alien worlds. They also donated 160 pints of blood — and did a bit of perspiring, since temperatures ran over the 100° mark.

The art shows and auctions were well attended, as were readings by writers like Frederik Pohl, George R. R. Martin and Kate Wilhelm, who gave previews of their works-in-progress. Guest of honor Ellison read from his new script adaptation of Isaac Asimov's *I, Robot*. Ellison was also the subject of a roast Sunday afternoon, with such notables as Robert Silverberg, Charles L. Grant, D. C. Fontana and David Gerrold doing the roasting.

And to insure the continuation of WorldCon-going, IguanaCon members chose Boston as the site of the 1980 con, with Damon Knight and Kate Wilhelm as guests of honor. The 1979 WorldCon will be held in Brighton, England.

—Michael Cassutt



PHOTO: JAY K. KLEIN

Guest of honor Harlan Ellison holds forth at IguanaCon, the 36th annual World Science Fiction convention, held in Phoenix.

HUGOS & OTHERS

The fans at IguanaCon also gave awards. The 1978 Hugo winners are best novel, *Gateway* by Frederik Pohl; best novella, *Stardance* by Spider and Jeanne Robinson; best novelette, *Eyes of Amber* by Joan D. Vinge; best short story, *Jeffty is Five* by Harlan Ellison; best dramatic presentation (no surprise here), *Star Wars*; best professional artist, Rick Sternbach; best profes-

sional editor, George Scithers of *Isaac Asimov's SF Magazine*; best amateur magazine, *Locus*; best fan writer, Richard E. Geis; and best fan artist, Phil Foglio.

Some non-Hugo awards were presented too: Orson Scott Card won the John W. Campbell Award for best new writer in the field, and the Gandalf Awards went to Poul Anderson (as grand Master) and J. R. R. Tolkien's *The Silmarillion* (best book-length work of fantasy).

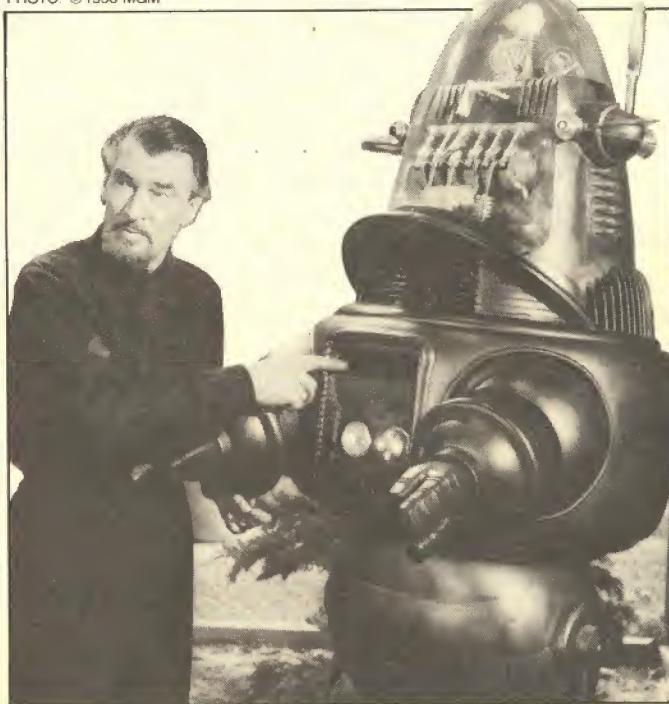
"FORBIDDEN PLANET" WILL SURVIVE . . . EVEN IF THERE'S NO ONE TO SEE IT

If there's ever a nuclear war, chances are good that a print of MGM's *Forbidden Planet* will survive. But if you're still around, you will have to go to Hutchinson, Kansas, to see it.

While you're there you can also take in *Gone with the Wind* and the Andy Hardy series, assuming you can find a movie projector to show them. The prints of all MGM's films, as well as Encyclopedia Britannica data reels, assorted business records and many other items are safely preserved in the hollow of a salt mine an eighth of a mile under Hutchinson.

During the paranoid Cold War days of the 1950s, the question of what would happen to the accumulated knowledge of the human race in the event of nuclear holocaust provided the plot for a host of

PHOTO: © 1956 MGM



Robby the Robot's *Forbidden Planet* performance is safe.

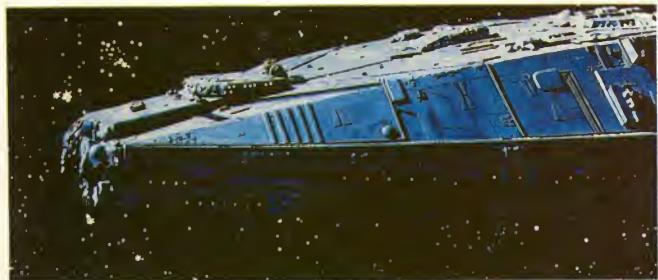
science-fiction novels. A group of Kansas businessmen worried by the same question constructed Underground Vaults and Storage, Inc., a 50-million cubic foot warehouse under Hutchinson.

While cold war fears have lessened, the value of the underground storage center has increased. Its temperature — a year-round 68° — and humidity — never over 50 percent — are excellent for preservation. Lack of air circulation makes fires unlikely, and there are no pests such as rats or bugs to chew up important papers.

Some insurance companies reduce premiums on valuables stored underground, and space there costs less than surface storage. Many people store personal valuables and memorabilia in the subterranean vaults; it contains stamp collections, jewels, one woman's wedding dress and family scrapbooks.

Among proposed future uses: storage of sperm to insure family continuity, of tissue for cloning and of bodies cryogenically frozen in hope of future resurrection.

—Allan D. Maurer



THE MAKING OF "GALACTICA"

When producer Leslie Stevens was attempting to launch *Battlestar Galactica* into the video airwaves, he found himself faced with a host of fairly strange obstacles. Not only did he have to surmount the usual hurdles required for the birth of a new TV show, but he had to deal with a horde of bizarre problems created by *Galactica's* futuristic stance. "The show was new and unexplored territory for television," Steven recalls, "and that made things difficult. The problem was that because we had to create an entire environment that had never been seen on Earth before, nobody knew what we meant when we said, 'We want Cylons to have a scanner in their helmets.' Everyone had different ideas about what a Cylon helmet should look like, let alone a scanner. So, we had to draw pictures, do designs, have it modeled

and modified and so on.

"The sets were also hard to construct. At first, we had very heavy columns on the bridge of the ship which got in the way of the camera. We had to take a few of them out and everyone was quite demoralized at having built a whole set that didn't work. We just had to hang in there and come up with solutions.

"The biggest single problem was making everything on the show look *different*. We couldn't just take anything and make it the same in the future as it is today. Doorknobs wouldn't be the same. People's shoes wouldn't be the same. There were thousands of details to worry about.

"We even had to update the food. We wanted weird food. But what exactly was *weird* food? I had to go over to the commissary and sit there with the chef and tell him to cut kiwi fruit in sections and put it in funny little arrangements on plates, and to take a lobster and stick it on the front end of a fish and do things that would make everything look pecu-

liar. He built stuff out of cantaloupe rings and piled them on top of each other. He even colored grapefruit two different hues just to make it look strange." Ironically, viewers will never see the creations since someone forgot to shoot a closeup of the banquet table during filming.

With *Galactica* now firmly entrenched on ABC-TV, Stevens can look back on these all-encompassing

problems and laugh. He stresses, though, that at the time, the battle against the army of futuristic details was a pretty grim one; a battle that was won largely because of *Galactica's* team of creative crackerjacks. "We just couldn't let the show fall apart because of little difficulties," Stevens shrugs. "And that sort of dedication took place in every department." —Michael Esteban

Weird food and scanners for the Cylon helmets were some of the creative challenges for *Battlestar Galactica's* makers.



PHOTOS: © 1978 ABC



SCIENCE FICTION— 007 STYLE

James Bond is back and he's better than ever! After the unprecedented financial returns of the last fantasy-filled 007 opus, *The Spy Who Loved Me*, producer Cubby Broccoli has started production on what he feels will be the biggest and

Roger Moore as James Bond—back soon in a space shuttle saga.

best of the Bonds — *Moonraker*. Both star Roger Moore and director Lewis Gilbert have returned for this new production, budgeted at a whopping \$25 million and scheduled for five months of globe-trotting filming in Paris, London, Venice and Rio de Janeiro.

What makes the eleventh in the 007 film series of special attraction to SF fans is that the plot of *Moonraker* revolves around the maiden flights of NASA's space shuttle. "The space element will be more science fact than science fiction," Broccoli declares. "We will be putting on the screen what NASA would now be doing if they had been given the money. It may not correspond exactly with what the real-life space program has accomplished, but we'll be showing what is within the present capabilities of the National Aeronautics and Space Administration." —Richard Meyers

TRANSPLANTED TURTLES

In an attempt to save an endangered species of Mexican sea turtles, Texan conservation teams have set up a refugee camp along their shore designed to house transplanted turtle eggs. This past summer over 2,000 Atlantic Ridley turtle eggs were airlifted to the Padre Island National Seashore from their Mexican homeland.

It seems that in Mexico the eggs are regarded as an aphrodisiac by locals, and each year truckloads are pilfered from their nests and sold to love-starved citizens. As a result, the population of the Ridley turtle community is dwindling rapidly. Last April, concerned biologists from both Mexico and the U.S. began collecting dozens of eggs and, escorted by Mexican marines, shipped them to the U.S. and other incubation camps located in Mexico.

The plan calls for the eggs to be hatched on substitute beaches in safe surroundings. Once hatched and acquainted with the sea, the turtles are then flown to the National Marine Fisheries Service in Galveston, Texas. By mid-summer there were already over 1,500 turtles present, all being fed a special diet concocted by biologists.

After a year of protective life the turtles will be allowed to return to the waters of the Gulf of Mexico. Long-term plans call for the turtles to obey the laws of Mother Nature—mature, spawn and ultimately return to their man-made home on the beaches of Padre Island to lay more eggs. Scientists involved in the project will not know whether their efforts have been successful until the first "saved" turtle mothers deposit their eggs on the sands of Padre Island . . . and that could take up to eight years. The biologists are philosophical about the long wait, however. Turtles have never been known for their hastiness. —William Pratt

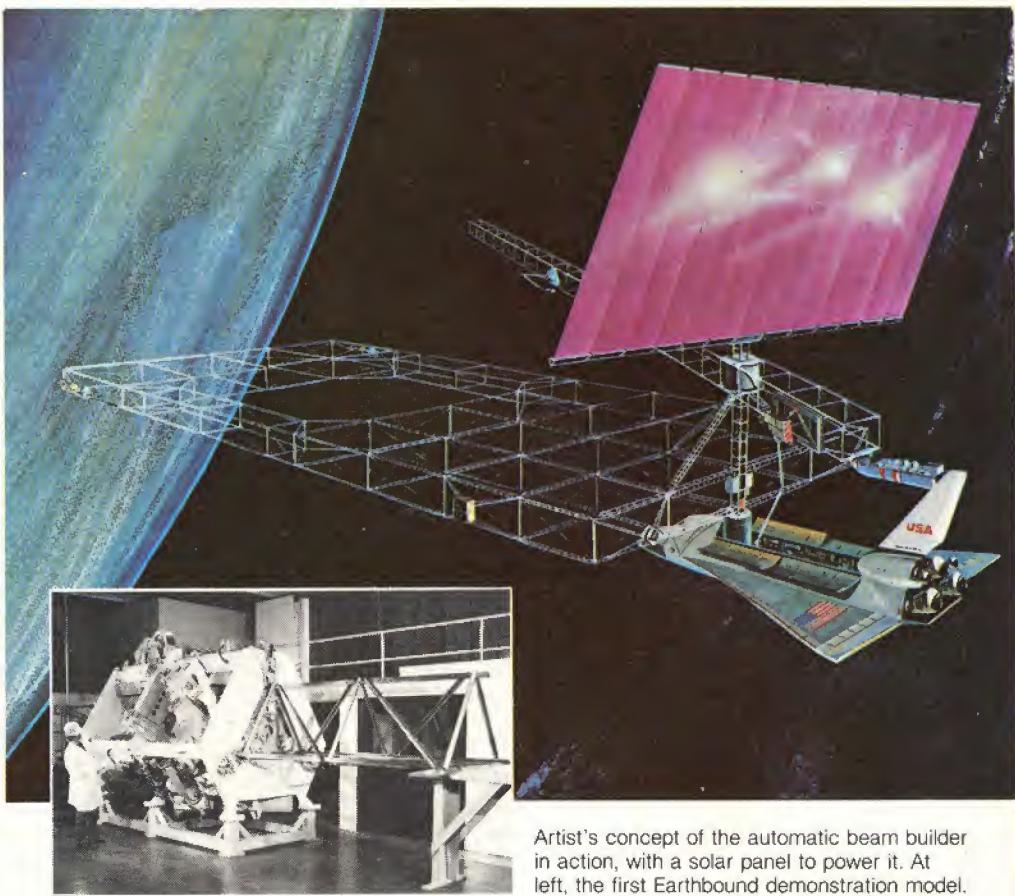
ROBOT BEAM BUILDER

What is the best method for building large structures in space? One answer is a new piece of hardware under development by NASA called the Automatic Beam Builder. The eight-ton machine will be carried into orbit by the space shuttle. Spools of sheet aluminum fed into the beam builder will be mechanically transformed into miles of light but sturdy beams.

Engineers believe that beams which weigh less than one percent of conventional forged steel beams will be strong enough in the weightlessness of space. The beams may serve as the basic structure for multi-use satellite platforms, solar power satellites, space stations and various other zero-gravity construction projects of the future.

The first Earthbound demonstration of the automatic beam builder was conducted recently by Grumman Aerospace Corporation, the company which developed the machine for NASA. The computer-controlled robot smoothly transformed aluminum strips and braces into a one-meter, open-trussed structural beam. By the 1990s the beam builder could become a common construction tool in space.

—Robin Snelson



Artist's concept of the automatic beam builder in action, with a solar panel to power it. At left, the first Earthbound demonstration model.

ART: HOWARD CRUISE



Danish high school students designed their own energy source.

DANISH WINDMILLS SPARK ELECTRICITY

A group of 30 high school students in Denmark just may have come up with a solution for that nation's energy shortage by resorting to an age-old, often-talked-about but seldom-used means of power . . . the windmill. The students from the progressive Tvind high school spent three years building a \$900,000, 175-foot-high windmill that, much to everyone's surprise, works perfectly. None of the students had any previous training in either engineering or construction prior to their Herculean effort.

The experiment had its origins during the 1973 oil embargo when a lack of available fuel drove up the school's heating bill to astronomical levels. But the Tvind school was not the only victim of the shortage. The entire country of Denmark was hard hit, since the country has almost no fossil fuels of its own. While nuclear energy groups touted a high-risk solution to the energy shortage, the students and teachers at Tvind decided to present a more homegrown

method of producing energy.

They asked for federal aid for their efforts and the Danish government, although touting a \$12-million fund for experimentation in alternative energy systems, promptly shrugged off their pleas. Windmills? Undaunted, the Tvind task force turned to both public and private contributions to get the project going. After nearly two years of canvassing, work began.

This year the finished windmill was put to the test and is currently running smoothly. Tvind officials are so confident of their newfound energy source that they predict the machine, by 1979, will be producing enough power to light and heat the school's 140,000-square-foot complex.

Local residents who once scoffed at the Tvind "children's crusade" for new answers to the energy problem are now gaping in open admiration at the mammoth structure. As well as becoming an excellent example of alternative energy systems, the windmill has now become a local tourist trap—and a monument to the inventiveness of young minds.

—Ed Naha

UPDATE: VOYAGER PROBES

PHOTO: NASA



Launched last year, Voyager 1 took this dramatic picture of the Earth and the Moon from 7.25 million miles away. Both Voyager spacecraft recently cleared the asteroid belt, a band of rock and dust 223 million miles wide, between Mars and Jupiter. Voyager 1 will make its closest approach to Jupiter in March 1979, and Voyager 2 will pass the planet in July 1979. The two probes will continue on to Saturn, then possibly Uranus and Neptune before leaving the solar system.

SYNTHETIC SKIN A REALITY

A surgeon and a mechanical engineer have brought a classic science-fiction concept into the realm of medical reality with the announcement of the creation of synthetic flesh. Dr. John Burke, surgeon-in-chief of the Burn Unit of the Shriners Hospital for Crippled Children in Boston and Professor Ionnis Yannas of the department of mechanical engineering at Massachusetts Institute of Technology announced the results of their successful study recently in Boston, astounding the medical world.

Experimenting for four years on animals, the two men slowly developed an artificial skin that proved to be a satisfactory, albeit temporary, replacement for the real thing. "It acts, functionally, very much like real skin," Dr. Burke states. "It doesn't look like the real thing; it is whitish, although I suppose we could

make it any color we wanted. Our ultimate goal is to have a permanent replacement. In the animals, we replaced great areas of skin loss. We expect to use it in the same way with people. It is absolutely temporary now. In animals, we're talking about a month."

Dr. Burke hopes to be able to use the synthetic skin on burn victims within a year, replacing the current hospital practice of replacing damaged skin with substitute *human* flesh. "Actually," Dr. Burke explains, "we're not going to improve on skin. Skin borrowed from other people works very well. But it is rejected in a short time, and it would not be as readily available as synthetic skin. You could say it (the synthetic flesh) would be tailor-made."

Dr. Burke refers to his new finding as *semi-synthetic* flesh since he doesn't create it from scratch. "We start from natural materials." The skin is structured from collagen, a fibular substance "that is the supporting structure of all biological systems."

—William Pratt

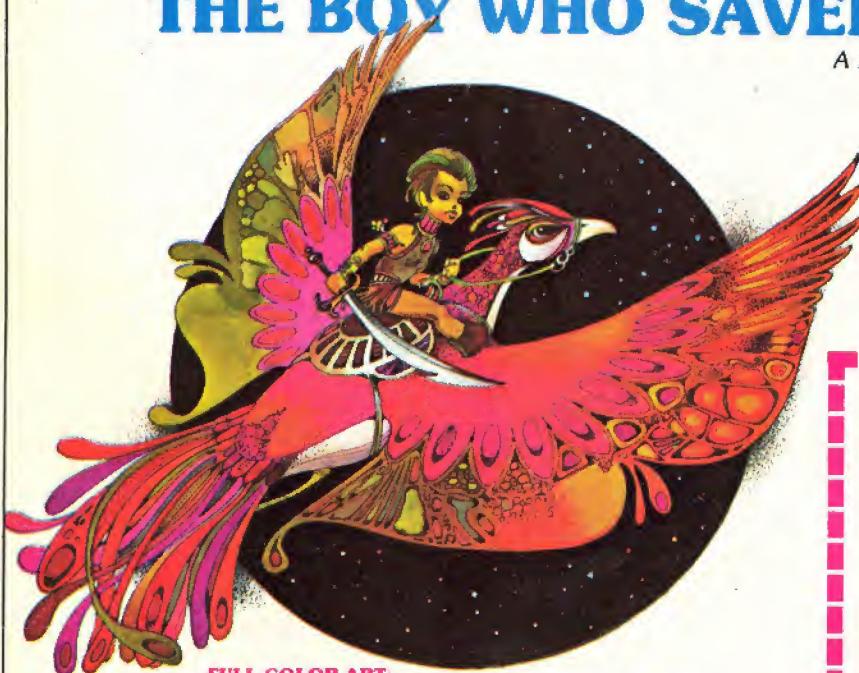
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An exciting, inspiring story, which we recommend for children of all ages who enjoy heroes.

Historic in several ways, this is the first book Boris has illustrated for children, as well as his first published collaboration with his writer/wife, Doris. Done especially for STARLOG/FUTURE, this imaginative fable of space is destined to become a modern classic in youth literature.

Beautifully printed in vivid full color on every page, this horizontal-format, hardbound book (complete with dust jacket) can be found in select book store outlets or can be ordered directly from the publishers. It will make a wonderful holiday present that will be re-read and treasured for years to come.

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Japanese space schooner encounters Earth-like planet in new Nipponese SF offering, *Message from Space*, with Sonny Chiba.

PICTUREPHONE GETS DOWN TO BUSINESS

Picturephone in every home—or so some of us thought when AT&T introduced the video telephone at the 1964 World's Fair. But Picturephone was a flop: too expensive to buy and to use. Not enough people bought them, and those who did soon got tired of talking to the same small network of other Picturephone owners. Eventually AT&T cancelled the service.

Now Picturephone is back—in color—in a limited market test that's designed to see if a more sophisticated version of the video phone can be a useful (and saleable) business tool.

A cross between an executive conference room and a very expensive pay phone, Picturephone Meeting Service links conferees in New York, Chicago, Los Angeles, San Francisco and Washington, D.C. Specialized designed meeting rooms are equipped with video monitors, cameras, microphones, facsimile copiers and even old-fashioned blackboards.

A business customer in New York can hold a meeting in Los Angeles, with six active participants in con-

ference rooms on each end, for \$390 an hour. It may sound expensive, but compare with the cost of flying six New Yorkers to L.A. and back, plus hotel bills, and you'll see why business customers can save money with video conferencing. More than money saved, time saved is a valuable commodity to the busy business customer. With facsimile copiers and strategically placed cameras, charts, graphs and documents can be transmitted across the wires. About the only thing Picturephone can't provide is the handshake to close the deal.

AT&T expects Picturephone Meeting Service to be in widespread use by the 1980s, with video conference rooms installed right in corporate offices. And AT&T expects the price to come down. Right now the biggest cost is transmission, with everything going over telephone land lines. But with developments in fiber optics and communications satellites, the transmission cost should be significantly reduced.

In the 1980s, business customers will shoulder the cost of development and debugging the Picturephone, so that by the 1990s it may be economical to have Picturephones in every home. —Robin Snelson



Picturephone conference room: is the business trip obsolete?

NEW JAPANESE SF

Japanese filmmakers are sending America a message and the message is science fiction. In the wake of *Star Wars*, comes *Message from Space*, a high falutin', ray-gunning adventure that's short on scientific realities, but long on planet explosions, starship battles, galactic color and samurai fights (strongly reminiscent of a certain "light saber" duel). This new oriental production also boasts an internationally famous cast and some of the best special effects seen from the Far East in a long time.

Heading the cast is Sonny Chiba

as Urocco, a star warrior who is entrusted with the task of locating eight heroes to save the planet Jillucia from the war-mongering Gavanas. One of the first saviors is Vic Morrow as a drunken, disgraced general. Joining them are the likes of Philip Casnoff, Peggy Lee Brennan and Tetsuro Tamba (last seen on this side of the Pacific as "Tiger Tanaka" in *You Only Live Twice*), all teaming up in a world-shaking war to end all world-shaking wars.

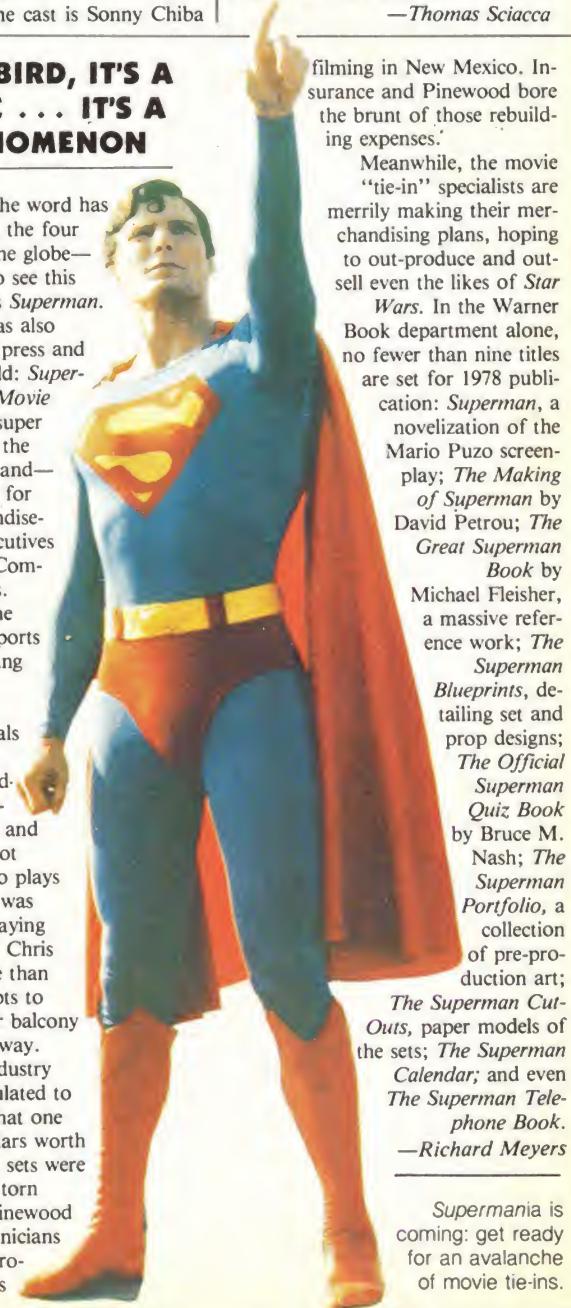
This *Message* is already raking up great box-office receipts at home and is presently up for bids for distribution by stateside studios.

—Thomas Sciacca

IT'S A BIRD, IT'S A PLANE . . . IT'S A PHENOMENON

By now the word has reached the four corners of the globe—the movie to see this Christmas is *Superman*. But word has also reached the press and cinema world: *Superman—The Movie* has been a super struggle for the filmmakers and—a super sale for the merchandise-minded executives at Warner Communications.

During the summer, reports began filtering into newspapers and trade journals about the various headaches assaulting the cast and crew. Margot Kidder, who plays Lois Lane, was quoted as saying that it took Chris Reeve more than fifty attempts to leap off her balcony the proper way. Then an industry rumor circulated to the effect that one million dollars worth of standing sets were mistakenly torn down by Pinewood Studio technicians while the production was



filming in New Mexico. Insurance and Pinewood bore the brunt of those rebuilding expenses.

Meanwhile, the movie "tie-in" specialists are merrily making their merchandising plans, hoping to out-produce and outsell even the likes of *Star Wars*. In the Warner Book department alone, no fewer than nine titles are set for 1978 publication: *Superman*, a novelization of the Mario Puzo screenplay; *The Making of Superman* by David Petrou; *The Great Superman Book* by Michael Fleisher, a massive reference work; *The Superman Blueprints*, detailing set and prop designs; *The Official Superman Quiz Book* by Bruce M. Nash; *The Superman Portfolio*, a collection of pre-production art; *The Superman Cut-Outs*, paper models of the sets; *The Superman Calendar*; and even *The Superman Telephone Book*.

—Richard Meyers

Supermania is coming: get ready for an avalanche of movie tie-ins.

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FUTURISTIC FLICKS ON THE WAY

Science fiction continues to shape up on the silver screen, with a host of new titles currently in the works. The science of today becomes the evil of tomorrow in *The Microwave Massacre*, currently filming in Los Angeles ... New World Pictures is mulling over an A. E. Van Vogt original entitled *Computerworld* ... Also on the drawing board is a monstrous entry entitled *The Slithis Returns*. An SF-horror film set in the very near future ... Disney's *The Spaceman and King Arthur* will surface next year — a slight reworking of Twain's *A Connecticut Yankee in King Arthur's Court* ... Also due in '79 is *Star Trek—The Motion Picture* (with a Christmas target date), *Superman II* and *Meteor* ... Currently shooting is *Alien* (in England), *Legacy of the Stars* and *Prophecy*, a parapsychological tale of the not-too-distant future.—Joseph Kay



PHOTO: ©1974 AIP

LUCKY THEY'RE NOT AROUND TO READ THE REVIEWS

Dinosaurs, long portrayed as lumbering, cold-blooded and pea-brained by both scientists and science fiction, may have suffered some bad press.

During the last ten years, research has shown that at least some dinosaurs were fleet, small and probably warm-blooded, according to Dr. John Ostrom in the August issue of

Maybe dinosaurs weren't so dumb after all, says the latest research. Will future monster flicks reflect the IQ increase? Stay tuned ...

National Geographic magazine.

Some of the more "sophisticated" dinosaurs even had "relatively gigantic brains," says Adrian Desmond, author of *The Hot-Blooded Dinosaurs*. Desmond's book documents much of the research that has led scientists to accept these changes.

Even with brains larger than peas, the likes of brontosaurs and tyrannosaurs were still far from what you would call smart. Desmond explains that to a dinosaur, a relatively gigantic brain means "some even larger than those of birds."

—Allan D. Maurer

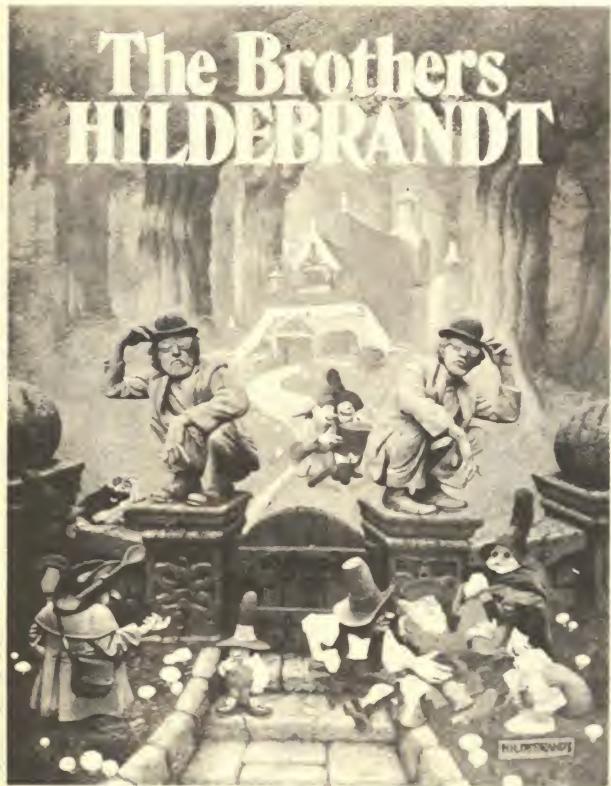
ACKERMANSION WOWS 'EM

Forrest J. Ackerman, the curator of the largest SF-fantasy collection in the world, is currently refurbishing his Los Angeles Ackermansion — covering a wall with the names of the fans who have helped support his burgeoning assemblage of memorabilia over the years. Among the envelopes currently on display in the Los Angeles museum are those sent by Ray Bradbury, Isaac Asimov, Frank Robinson, L. Ron Hubbard, A. E. Van Vogt, Ron Graham and Tetus Yano.

Also on display will be Forry's guest book wherein mind-boggled fans jot down their feelings on FJA's wonder-laden house. Some of the more noteworthy comments come from George Pal ("The Fort Knox of science fiction"), Bela Lugosi ("Amazed"), Steven Spielberg ("A living time capsule") and Elton John ("I'm Metropolized!").

—Joe Bonham

A BOOK ABOUT THE ARTISTS



DEALERS: Wholesale quantities of *The Brothers Hildebrandt*: 20 copies for \$75.00, postpaid.

For Hildebrandt fans, collectors, and art enthusiasts, we have published a limited quantity of a beautiful special edition book featuring the drawings and paintings of these talented artists. The book includes an interview with Tim and Greg Hildebrandt, photos of the brothers and their friends posing for paintings, original water color and ink drawings, pencil preliminaries, book and magazine covers, movie posters, and much of their early advertising art and children's book illustrations. Published with a full color cover, fifty-two pages, ten in full color, 8½ X 11 inches, on glossy paper. Order your copy today, directly from the publisher—only \$5.95 ea. (\$10.00 autographed by the artists) plus postage and handling.

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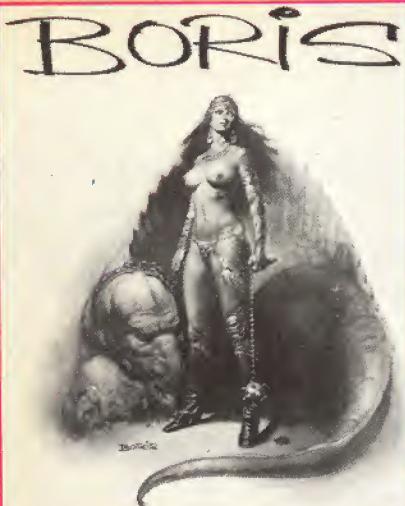
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COLLECTORS:

A few remaining copies of the 1978 Tarzan Calendar are still available. This features 12 glorious full-color paintings by Boris, on large format, glossy paper. While the present supply lasts—\$4.95 each, plus 90¢ postage.

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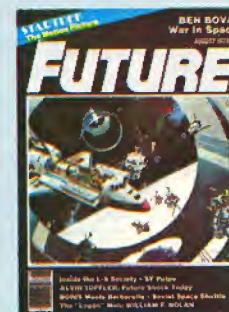
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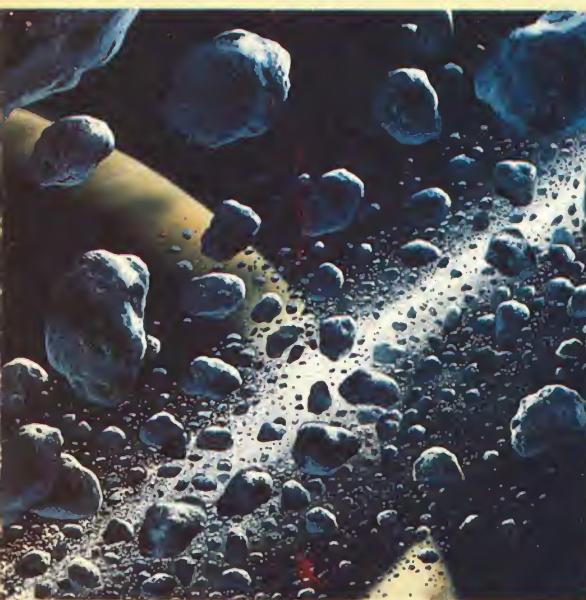
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The first-edition print of the Club will be this exciting Bob McCall vision.

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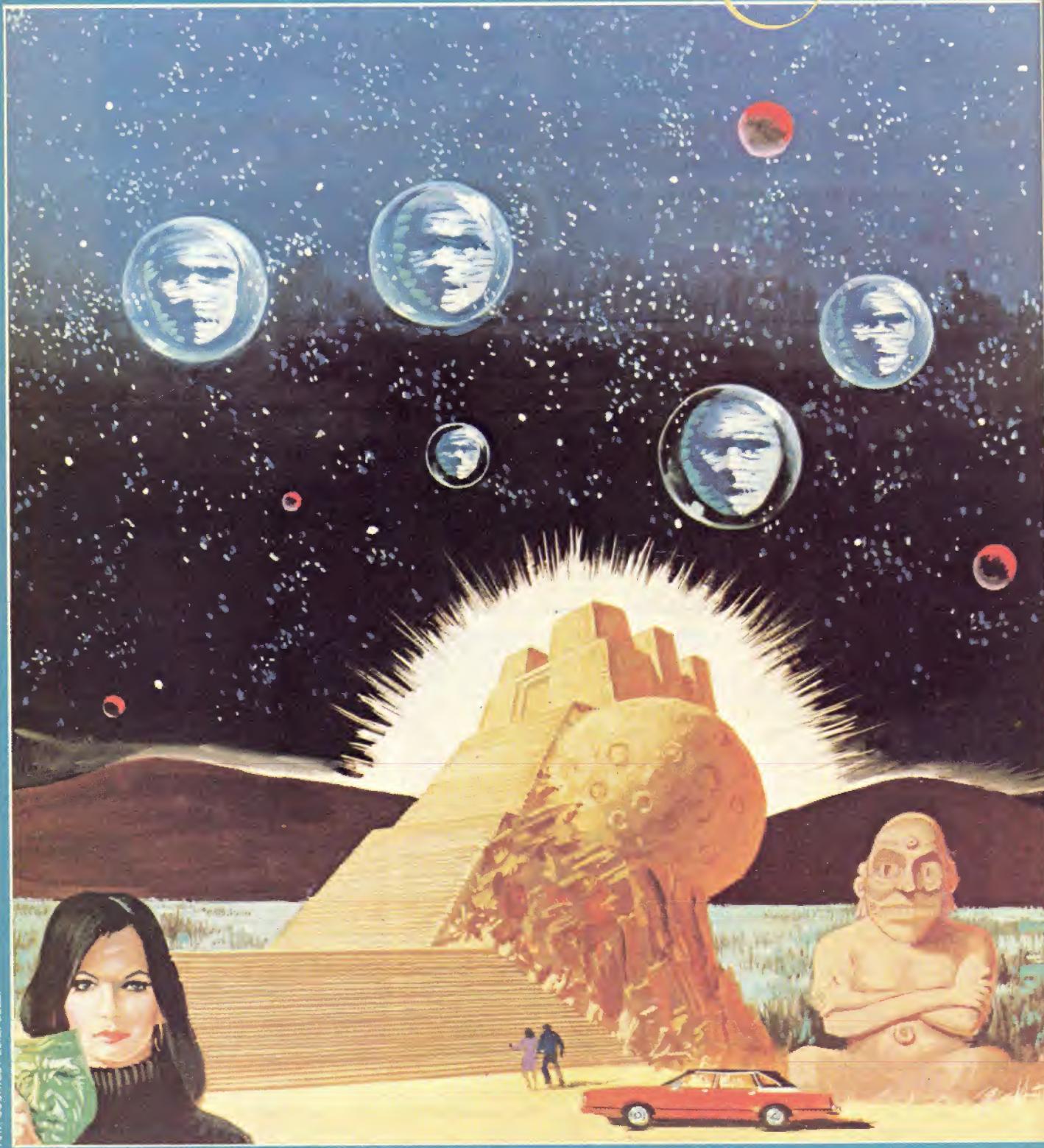
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A.E. Van Vogt



ART: COURTESY LUIGI COZZI

A rare pre-production painting for the proposed Italian SF film based on Van Vogt's *The House that Stood Still*.

Author A. E. Van Vogt is a man obsessed by systems, rules and logic. Somehow, he manages to mix them with literature and come up with classic science fiction.

By JEFFREY ELLIOT and AL FLYN

Few science-fiction writers are more interested in the workings of the human intellect than A. E. Van Vogt. In such classic works as *Slan*, *The World of Null-A*, *The Voyage of the Space Beagle*, *Destination Universe*, *The Weapon Shops of Isher*, *The Darkness of Diamondia* and *Children of Tomorrow*, he has delved into such cerebral concepts as hypnotism, telepathy, semantics, "similarization" and Dianetics. Although some science-fiction buffs view his prose as the work of an SF "traditionalist," his plotlines reflect his love for the "experimental."

Van Vogt's delight in intellectual adventure permeates the author's real life as well. During the course of his lifetime, he has explored the dynamics of violence, pioneered a technique for recording dreams and is presently attempting to simultaneously master 200 world languages.

Although an acknowledged SF heavyweight since the early forties, Van Vogt has remained a somewhat private figure in the genre, allowing his work to speak for him. Today, however, the tall, soft-spoken writer is putting through his Hollywood home speaking freely of his career and his various intellectual pursuits. Although an acknowledged master of SF for nearly four decades, Van Vogt speaks of his craft with the enthusiasm of an adolescent, punctuating his thoughts with such spontaneous exclamations as a "yee gads" and "golly."

Van Vogt is a man obsessed by systems, rules and logic. His analytical approach to the world-at-large transcends his literary style, becoming a sort of catch-all philosophy for life. "During the course of life," he muses, "one is always full of doubt concerning various things. You read about this and you read about that, and you realize that you just can't comprehend people. You're amazed at the way they are. At a fairly young age, I started looking at individuals and situations and problems and tried to find a common characteristic . . . the core, the essence of the topic."

A writer who authored radio plays and true confession articles before turning to SF, Van Vogt can actually, objectively, trace the origins of his spacey literary career to one, solitary incident in his past. "Since I'm what used to be called a

square, it seems odd that I became a writer," he begins. "But I think I know the reason why. When I was two-and-a-half years old, I fell out of a second story window onto the ground below. I was unconscious for three days.

"As an adult, trying to penetrate the unconscious by means of, first, hypnosis and, then, psychotherapy, I discovered that such comatose states, when mentally poked at, give off clouds of fantasies and hallucinations. My science-fiction writing is the brain's effort to stabilize, rationalize and make sense out of this endless stream of images."

When barely out of his teens, the Canadian-born Van Vogt was drawn instinctively to science fiction, but found the field lacking in terms of literary depth. Then fate intervened. "I was in a store in Winnipeg," he recalls. "And I picked up *Astounding*. It was the July 1938 edition, I think. I had read *Amazing*, which I thought was truly awful, but I started reading *Astounding* and came across a story, 'Who Goes There?' by Don A. Stuart, a pseudonym for editor John Campbell. I had read half the story when I thought, 'Gee, I had better buy the magazine and finish reading this.'

"The story really inspired me. I wrote John W. Campbell a letter stating how stimulated I had been by the story, and I told him a few story ideas that had come to me. It was a one-paragraph letter listing my writing credits and ideas. He answered the letter and gave me direction. If he hadn't answered this letter, I never would have become a science-fiction writer."

Van Vogt immediately caused a furor in the SF community, penning the classic *Slan* less than two years after writing Campbell and using a literary style unbelievably tight, concise and rigid. Van Vogt's writing style has always been a source of controversy, alternately being labeled "formula" and "old-hat," as well as being touted as "intellectual" and "enigmatic." According to Van Vogt, there is a bit of truth in both descriptions.

"When I first started writing science fiction," he recalls, "I found that I had a good system of writing fiction. Using a formula, I could do it well every time. I found the methods in two books: Thomas Uzzell's *Narrative Technique* and John Gallishaw's *The Only Two Ways to Write a Story*. Gallishaw especially influenced me. He took a group of twenty well-known short stories and analyzed them

The Art of Cerebral Science Fiction



PHOTO: CHRISTIAN GEMIGNANI

" . . . I do everything by one or more of a dozen thought systems. Through this objectivity, I can actually hone in on emotion, explain it, analyze it."

line by line. I have been doing that with my writing ever since.

"Basically, he said there are two types of stories: those of accomplishment and those of decision. Each has to be written differently, with a different rhythm. To show you how *awful* it is for a person to get involved in this sort of systematic outlook," Van Vogt laughs, "the *story of accomplishment* rule boils down to this: you have two statements and a response, two statements and a response . . . all the way through the work until the end where a decision is made for an emotional reason, and then you have one statement and *two responses*. Isn't that awful? Out of that, I create novels."

Van Vogt was truly ahead of his time in terms of his calculated approach to literature and, at times, found himself harshly criticized for its mesmerizing effect. This effect, however, was just what the author had in mind from the outset. "I used to write my stories in, roughly, 800-word scenes," he says, "each with five steps. Each sentence was a fictional sentence, meaning it either had imagery or emotion or suspense, depending on the type of story I was dealing with. After I completed my first draft, I would go over the entire story, decide what emotional effect I wanted in each section and then insert sounds to create what I called *ritual emotion*. For example, consider this battle scene:

"The line of fire crept along the length of the enemy battleship. The effect was beyond Clane's anticipation. The flame licked high and bright. The night came alive with the coruscating fury of that immense fire. The dark land below sparkled with reflected glare."

"In this passage, I substituted words with the 'k' sound in them wherever I could find one with a similar meaning to the one being replaced. I felt this created a subliminal emotional effect on the reader suitable for battle scenes. Now, if you argue that there could be a lot more 'k' sounds inserted in such a paragraph, my answer would be that I didn't want a poetic effect or even simple alliteration. That would be obvious. I've done that, but for different reasons. After my writing style came in for extensive criticism, I thought, 'Well, maybe I'm wrong.' These days, I merely aim in the general direction of such techniques. Principally, I now concentrate on greater story content."

Van Vogt's letter-perfect approach to science fiction has been termed unemotional by some. The author agrees to an extent but insists that being overly emotional in fiction writing is harmful to the finished work. "As a *square*," he states, "I do everything by one or more of a dozen thought systems. Even when I suddenly feel what seems to be a spontaneous emotion, I examine it immediately with a systematic thought that relates to human

behavior. I have to remain objective when writing. Through this objectivity, I can actually hone in on emotion, explain it, analyze it."

Thus, Van Vogt believes that by sticking to sheer intellect, an author can create the essence of the *human condition*. "As an example of this system," Van Vogt says, "I once wrote a book called *The Money Personality*, which I based upon what I could recall about three persons with whom I went to school — all of whom had gotten quite wealthy. I was sort of astounded because I had always thought I was smarter than they were. I'm not putting them down or anything, but I was amazed that they had made it. I spent several years just thinking about the way they were, some of the characteristics that had shown up in their behavior. You know, 'In the seed is the whole oak tree,' 'in the youth is the finished man.' I worked on the assumption that you're going to make it because you've got something there. So I found the common bond between the three of them. Just the other day I got a call from a fellow visiting from Phoenix who read the book two years ago. He studied it and became successful. He wanted to pay me \$100."

During his study of success, Van Vogt found extra reason to stick to his series of thought systems. "One of the qualities that these successful people had was the quality of being a non-victim. All the successes I saw were non-victims in an emotional way. There are victims and non-victims in life. I wasn't born a non-victim. I was victim number one for years. Over the years, in a non-emotional way, I had to work out a system for me to become a non-victim; to step back and observe situations. I can do it quite easily now."

Similar systematic studies conducted by Van Vogt concerned the common traits of violence in the male emotional makeup (resulting in his only non-SF novel, *The Violent Man*) and the personality of women. "I haven't really done a novel with that yet," the author concedes. "But I have a series of systematic thoughts about women. And women are very interested in my conclusions because they don't know the way they are."

To Van Vogt's credit, he has managed to use this unemotional approach to writing to create some of the most charismatic *personalities* in science fiction; personalities who lure the reader into new universes, new trains of thought. But no matter how carefree or kinetic a character penned by Van Vogt may appear in print, one can always bet that there's a logical reason for every nuance, every personality trait, every name.

"In *Slan*," Van Vogt reveals, "my main character has a fairly unusual English name: John Thomas Cross. I called him *Jommy* at age nine to get that 'boy' effect, even though as a 'Slan' he was much

above my nine-year-old human, intellectually. I called him *Jommy Cross* at age fifteen when, mentally, he was as developed as a grown man. But I hoped to retain a youthful flavor. As an adult 'Slan,' I called him *Cross* using only his last name. How can you depict someone smarter than a human being? You can use word techniques like that."

Although Van Vogt acknowledges his ability to create enticing characters, he balks at using the term "real" to describe his creations. "That's a touchy subject with me," he warns. "There's a false belief extant that in some novels (science-fiction or mainstream) there's such a thing as 'good' characterization. The author, it's felt by some people, reaches down into the inner being of human beings and triumphantly pulls out and shows us a true-to-life character. This is absolutely impossible in our day and age. You cannot *define* a human."

"We're in a middle period of history. Given our elementary knowledge of human psychology, we simply don't have the insights required to accomplish that task. In truth, everyone is, or was, an automatic product of unscientific conditioning and of the casual accidents that occur in an unknowing environment. In my novel, *The Man with a Thousand Names*, I describe a super-rich man's son who takes full advantage of his father's great wealth. He's basically a neurotic individual and, I suppose, I do a rather skillful job of describing his character. If that's what you mean by characterization, then I've probably created one of my best characters."

"From my perspective, though, the depiction of someone's neurosis is not meaningful, even if it may prove interesting to other 'automatics.' My characters are often people in search of their identity. I believe that's the best anyone can do in our period of history. The protagonist is diurnally in search of himself. In *The World of Null-A*, the search arrives at a meaningful (or meaningless) point . . . when a live 'Gosseyn' looks down at a dead 'Gosseyn.' The last line in the novel reads: 'The face was his own.' "

Van Vogt staunchly defends his creative formula of discipline, objectivity and planning, yet he often finds that his most impressive brainstorming sessions are totally spontaneous. "I'm the original non-organized surprisee when it comes to what happens in my stories," he chuckles. "I suppose that's part of the no-easy-contact-with-my-subconscious characteristic. Those writers who have mental images flowing up easily from the depths of the mind can, I suspect, arrange and organize consciously and rapidly."

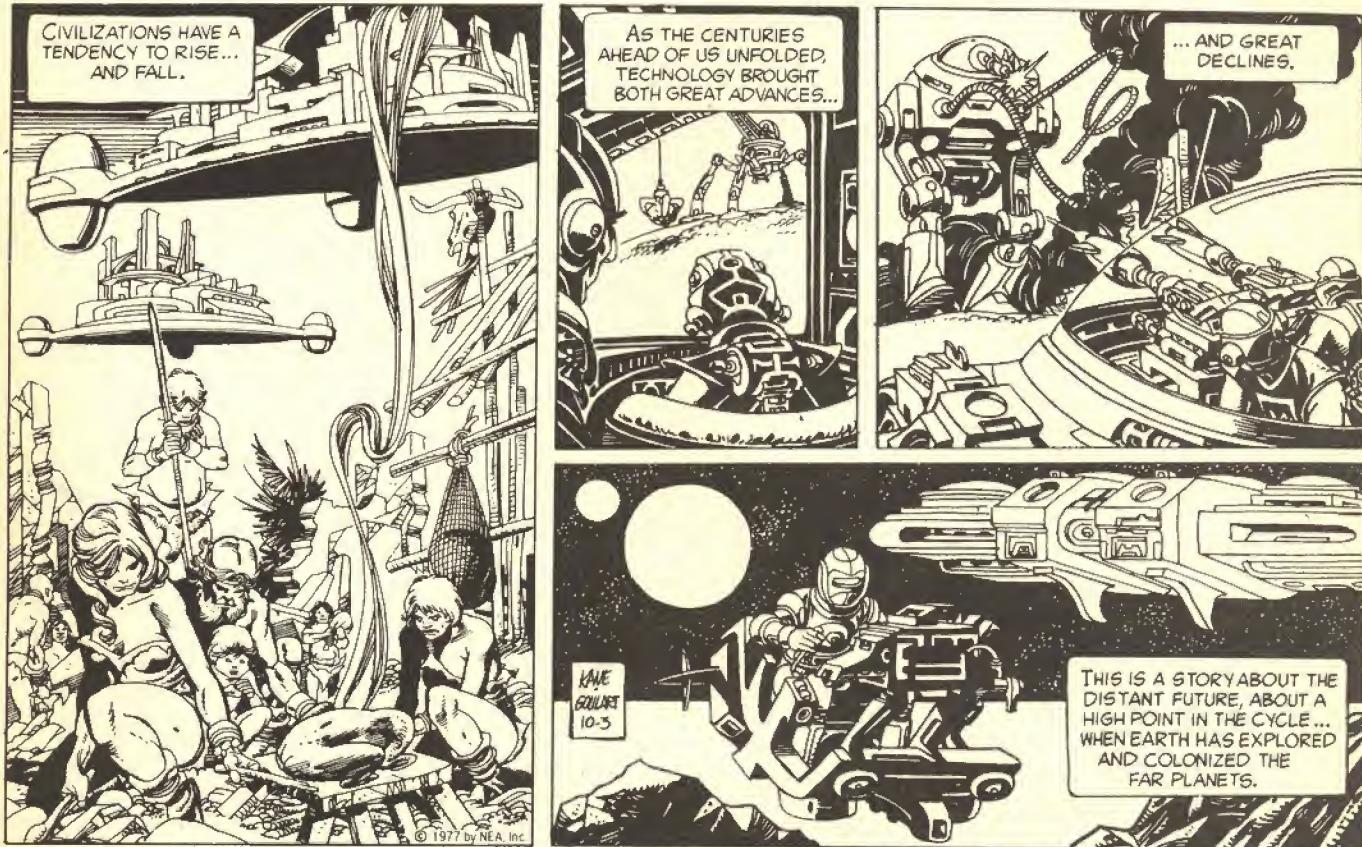
"This is what it takes to be a successful

(Continued on page 74)

STAR HAWKS

A DAILY DOSE OF TOMORROW

Move over "Buck Rogers" and "Flash Gordon" . . . here comes the first major SF comic strip to appear in 25 years!



The daringly designed comic strip *Star Hawks* is now one year old, becoming, in 12 months, the biggest SF strip since *Flash Gordon*.

By Steve Swires

October of 1978 marked the first anniversary of a unique experiment in boldly going where no syndicated newspaper comic

strip has gone before . . . *Star Hawks*. Written by well-known science-fiction author Ron Goulart and drawn by veteran comic-book artist Gil Kane, *Star Hawks* is the first major science-fiction comic strip in 25 years, and the first strip in the history of

comics to use the two-tier size.

Taking place "a long way from here, a long time from now, in a planet system not our own," to quote Goulart's introductory caption, *Star Hawks* details the adventures of Rex Jaxan and his sidekick

Chavez, agents of the Interplan Law Service, nicknamed Star Hawks. Set in the Barnum Planetary System, which is also the locale of many of Goulart's novels and stories, the strip combines Goulart's fondness for whimsy and satire with the flamboyant graphic style and unusual angles that have long distinguished Kane's artwork. In fact, he recently won his fourth National Cartoonists Society Award — *Star Hawks* was named the best story strip of 1977.

Syndicated by Newspaper Enterprise Association (N.E.A.), the strip represents the latest media manifestation of the science-fiction boom inspired by the success of *Star Wars* and *Close Encounters of the Third Kind*. And like those films, *Star Hawks'* success isn't merely limited to the United States. Almost half of the more than 100 newspapers that carry the strip are published in foreign countries, including England, France, Italy, Spain, Australia, Argentina, Trinidad and Manila.

Star Hawks is more than a simple *Star Wars* clone, and it was actually created well before George Lucas' film was released. "I live in Connecticut, and I hang around with a lot of cartoon and comic strip writers and artists," says Goulart. "We had lunch in Westport one day in 1976, and the Director of Comic Art for N.E.A., John 'Flash' Fairfield, was in from Cleveland. My friend Gill Fox, who does the *Sideglances* panel for N.E.A., wanted me to meet him. He suspected what, in fact, turned out to be the case—that N.E.A. was thinking of doing a science-fiction strip. They felt it was time for the adventure strip to come back. They wanted space opera, but not as serious as *Flash Gordon* — in the vein of *Star Trek*.

"I met Fairfield, and he found out I was a science-fiction writer. His wife is a librarian in Cleveland, so since he hadn't read my stuff, when he got back he asked her if she'd ever heard of me. She said, 'Oh yes, I love his work.'

"On that recommendation Fox called me back and gave me 'space opera, heroes, things that malfunction'—more or less the kind of material I'd been doing in my books anyway. I put together a rough outline of what the format would be and sent it to him. He liked it: 'Now the next step is to find an artist.' I suggested Gil Kane, but since neither Fairfield nor anybody else at the syndicate was into comic books, they'd never seen his work. When I asked Gil if he'd be interested, he said, 'It's my lifetime dream to do a comic strip.' Of all the artists I've worked with, he's a real science-fiction fan. He knew not

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Star Hawk Rex Jaxan is a futuristic hero cut in the stalwart *Buck Rogers*-*Flash Gordon* mold but with a healthy dose of contemporary humor and ideas mixed in for added clout. The Star Hawks are interplanetary trouble-shooters.

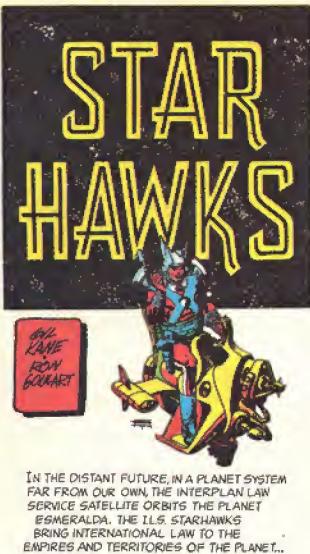
only all the strips, but he read SF. If we wanted to swipe something, we had a much wider range of shared knowledge. Most people would just swipe from *Star Trek* and *Buck Rogers*, but we could get all those obscure things.

"We did two weeks of dailies. The syndicate said, 'This looks terrific. Would you guys be interested in doing six weeks?' They were paying us for our work, but there was no contract. This dragged on for a year while I kept writing my other stuff and Kane was still working on comic books. Finally N.E.A. said, 'We think we'll try it out in our dozen key papers and see what they say. If they like it, we'll go ahead and do it.' "

"With a strip like this,' we said, 'which is unorthodox in some ways, it would be better to hit more people with it.' This went back and forth for another couple of months, and then fate stepped in.

Somewhere along the way, George Lucas had started to make *Star Wars* and we kept telling the syndicate, 'There's this movie coming, and from what we've seen in the fanzines, it's really going to be incredible.' They said, 'Sure, sure—somebody's always doing science fiction.'

"Then the movie opened, and as a coincidence N.E.A. syndicated a package containing the novelization and some stills, and that did fantastically. So everybody was sitting around the syndicate office saying, 'If we could just cash in on this science-fiction thing. Look what we did with *Star Wars*. If we only had something like that in comic strip form.' Of course Fairfield then said, 'You idiots, I've been trying to sell this *Star Hawks* strip to you for weeks!' The next thing we knew, 'Flash' called us up and said, 'Have you



The first Sunday strip featuring the Star Hawks. Kane and Goulart originally designed the strip to run in a daily and Sunday step-by-step adventure pattern. When some cities decided not to run the strip on Sundays, a new narrative formula had to be developed.

seen the four-color posters yet?" "What are you talking about?" we said. It turned out that they had sent a mailing to about 400 papers which included a poster, two weeks of glossy proofs and biographies of us. As a result, we were launched a lot more formidably than we would have expected, and that's what got the strip going."

Beyond the melding of humor and heroics with Kane's dynamic art style, the "unorthodox" nature of the strip is its distinctive double-size format, an idea formulated by N.E.A.

According to Goulart, "The syndicate felt that all the criticism about the waning of the adventure strip was due to the fact that it was getting smaller and smaller—a shot of a building, then two heads, then another head and that's the strip. Fairfield suggested doing it double-sized, otherwise it would be lost. Of course Kane agreed, because it gave him more room to draw."

Kane and Goulart were perfect choices to draw and write *Star Hawks*. Kane, 52, has been a professional comic artist for more than 35 years. In that time, among the many comic book characters he's illustrated have been *Spiderman*, *Conan*, *Warlock* and *John Carter of Mars* for Marvel, and *Green Lantern*, *The Flash* and *Batman* for DC. He won his first three National Cartoonists Society Awards for his work as Marvel's chief cover artist.

Goulart, 45, has been called by one critic "the Mack Sennett of science fiction," and it's an apt description. At his best, in his more than 200 stories and articles and 75 novels written over a 25-year period, he's taken devilishly sharp aim at society's foibles, setting them in an hilariously off-center future in which mechanical malfunctions and human aberrations are standard operating procedure. His comics-oriented work includes novelizations of such stalwarts as *Flash Gordon*, (under the pen name "Con Steffanson"—his eight-year-old son is named Steffan)

and *The Phantom*, (as "Frank S. Shawn"—his 16-year-old son is named Sean). As well, he's written a mainstream novel about the comic-book business called *The Tremendous Adventures of Bernie Wine*, which many of his readers consider to be his finest piece of fiction, and a study of comic strips of the 1930s titled *The Adventurous Decade*. In addition, he received the coveted Edgar Award from the Mystery Writers of America for his SF novel, *After Things Fell Apart*.

Goulart and Kane first collaborated on an adaptation of Robert Bloch's short story "Yours Truly, Jack the Ripper," published in Marvel Comics' *Journey Into Mystery* #2 some years ago. They also worked together on a few issues of Marvel's *Warlock* series.

With those credentials, Goulart and Kane were ideally suited to help N.E.A. realize its goal. "What the syndicate feels," Goulart says, "is that *Star Hawks* is a way to capture the younger people who don't usually read a newspaper. The target audience for everything is between the ages 15-30. That's why, when the syndicate decided to do an adventure strip, they chose science fiction rather than a *Steve Canyon*-type strip. They figured science fiction would reach that younger readership. Plus, Kane has a fairly large following in comic-fan circles, so the young people who collect comics would know him."

Goulart's apparent modesty also manifests itself in the strip's credits, in which Kane's name comes first. "I put it first," he says, "because I thought he was better known than I was. Besides, 'Kane and Goulart' sounds better than 'Goulart and Kane.' It also helps to avoid disagreements. He's so much taller than I am, I can't argue with him."

There was no argument when Goulart decided that the strip provided him with an appropriate opportunity to continue detailing the Barnum Planetary System

he'd worked out over the years in his other writing. "Barnum is the United States," he explains, "and all the different planets are different countries in grandiose form. Our foreign policy is acted out on all the planets. I figured I already had this planet system established, so I might as well use it for the strip. There's no conflict with the publishers of my books, because I own the concept of the Barnum System."

Despite the Barnum setting, Goulart doesn't plan to introduce any of his established book characters into *Star Hawks*. "I don't think we're ready for that right now. My science fiction is really anti-science fiction, because I'm making fun of a lot of genre conventions. I don't think the general readership of the strip is prepared for that yet. The average science-fiction reader that I'm aiming at with my novels and stories is familiar with those concepts. Doing a parody of that is a little more sophisticated."

"I don't think we've established the general skeletal structure of the Barnum System to where we can start doing too much comic relief yet. It obviously can't be too straight, or the reader will say, 'I've already seen that on *Star Trek*.' We have to be as individual as we can. Plus, I'm balanced by Kane, who is much less silly than I am, and is more concerned with lyricism and daring and adventure."

Indeed, as Kane told an audience at New York's Creation Convention, "What we're trying for is to get some of that sense of romantic adventure that used to be a part of science fiction. Most of all, we're after a feeling for costuming, the kind of snappy military style, a feeling for the ships they ride and the kind of backgrounds they're involved in."

"In order to use this much space, you have to justify its existence. You can't put a human-interest strip in this size and just fill it up with six panels of heads. The only justification for the strip is the exotic



THE HOOSIE GOW SATELLITE, ORBITING THE PLANET ESMERALDA IS THE HEADQUARTERS FOR THE INTERPLAN LAW SERVICE AGENTS, BETTER KNOWN AS STARHAWKS... AGENTS REX JAXAN AND CHAVEZ HAVE RETURNED THERE FOR THEIR LATEST ASSIGNMENT...



Above: another look at the early Star Hawks Sunday strip. Right: Ron Goulart (left) and Gil Kane pose with the Star Hawks poster that initially began NEA's great publicity push of 1977.

backgrounds, the terrain, the sense of space, the dramatic visualizations which you won't get in an ordinary strip. Fortunately, the format and the subject are ideally suited to each other. I can't imagine anything else now that can utilize the space better and more successfully than science fiction."

The working method that Goulart and Kane have evolved takes into consideration their different approaches to the strip, and enables each of them to contribute equal input towards the finished product. "We've worked out a variation on the Marvel Comics method," Goulart says. "It's more time-consuming, but then everything Gil Kane does is more time-consuming. It helps us with the pacing.

"We get together at his house once a week, usually on Saturday mornings. We sit around for three or four hours. Usually we talk for two hours about how we're getting screwed by the syndicate, and for one hour about how everybody in the



PHOTO: COURTESY NEA

business is going to pieces. Once we get all of that out of the way, we can get down to work. Depending on how much time I've had, I've already worked out a synopsis of the whole 8-10-week story.

"Originally the syndicate wanted us to tell the stories in six weeks, but we found that was too fast. They felt that readers have had their brains so badly damaged by television that they can't hold their attention for more than a few minutes. They'd just forget about a story that ran longer than six weeks. Therefore, we break the story every six weeks, sum things up for a couple of days and then continue the story. For example, they might be looking for 'The Maltese Falcon,' they'd find it and then the next week somebody would run away with it and we'd have another six weeks of story."

"At this point we don't have to get syndicate approval. I have to turn my finished copy in every week, but usually all they'll do is change a word or two."

"Kane reads my synopsis, and then we talk about it. I'll say, 'Chavez gets separated from Jaxan and the giant Goo-Goo Monster eats him. Jaxan gets mad and shoots the robot. Meanwhile, what they're looking for is buried in the middle of the ocean.' That's what we start from. Then we go back and say, 'Okay, where are we going? It's going to start here, and they've got to get to the lost city and find the missing princess. What happens along the way?' We work out each week's continuity one day at a time.

"Then Kane will break down each daily into a series of very rough sketches. My eight year old saw one and said, 'Boy, does he draw sloppy. If I drew like that in school, I'd flunk.' The important thing is that, despite how loose it may look, we know what it all means. Most of the time the sketches are fairly close to what ends up in the finished drawings. For my own benefit I take each daily and break it down again, and then add the copy. Sometimes I put the word balloons in before I write the copy, to see how many I'm going to need. Then I type the copy up in script form and send one to the syndicate, one to Kane and keep one for my files. In other words, Kane has storyboarded the movie and I've done the screenplay based on his storyboards. Sometimes I'll have to add adjustments like, 'This character is going to have to have a gun in his hand, because he's going to need it tomorrow,' or, 'Make sure we can't see the door, because there's going to be a surprise when the door opens.'

The major mechanical problem confronting them, however, is the unfortunate fact that certain newspapers don't run Sunday episodes. "We're still learning," says Goulart. "During the first six weeks of the strip, we made a mistake. On Saturday we had Chavez dive over the side of a tower holding a bomb, and then there was an explosion. On Sunday we showed that he wore a flying belt which saved his life.

STAR HAWKS



STARHAWKS JAXAN AND CHAVEZ ARRIVE AT THE EMPEROR'S PALACE JUST IN TIME TO SEE THE MISSING NAYDA KANDELL ABDUCTED... THEY ARE PURSUING.



On Monday he and Rex were off on their next adventure. What we didn't realize was that many readers couldn't figure out what had happened, because they hadn't seen the Sunday page. As a result, we can no longer have anything essential happen on Sunday.

"We have to save the big shots for Monday through Friday, because we realize that most people probably only read the strip three or four days a week. We've worked out a format whereby instead of abruptly cutting, we'll do an overlap. For example, on Thursday Rex might be saying at the end, 'Good lord, what's that? It's coming right in here and it's going to eat us!' On Friday we'll pick up a panel that's similar to that in which he'll say, 'Oh my god! It's getting even nearer!' Then we'll cut to Chavez somewhere else having a drink with a girl. We're still tantalizing the reader. We haven't told him what that was, but at the same time we pull the Thursday up into the Friday. Then we tend to use Saturday's strip for a gag or variation, and Sunday's for a sum-up or an elaboration. If you miss the Sunday you don't really miss anything, but if you get it, you get a little more insight into the characters and some nice visual shots."

More serious than the mechanical problems is the ever-present possibility of censorship. "A comic strip is the most cautious medium there is," Goulart has found. "We can't even do what *Three's Company* does on television."

In spite of the restrictions, there are still great satisfactions to be derived from writing and drawing a comic strip, not the least of which are financial. "The amount of money a newspaper pays for *Star Hawks* depends on its circulation," explains Goulart. "The syndicate is getting \$125 a week from certain papers, out of which Kane and I get \$75 between us. At the moment, we're on a guarantee. My guarantee is less than Gil's, because it real-

ly takes up all of his time to draw the script. I only spend two or three days a week on it.

"Obviously, I'm in this because I'm an *insane* comics nut, and it's nice to be part of history because you've done a comic strip. There aren't that many people who have done comic strips, and certainly not too many science-fiction writers have done them over the years—Jack Williamson did *Beyond Mars*, and of course Phil Nowlan did *Buck Rogers*. I've always wanted to do a strip, and so has Kane, so here was the opportunity being offered to us. From our point of view we're just beginning to see whether or not it's going to pay off in any really big way. We're still waiting for various accountings, to see what extra money we can get."

Some of that "extra money" will result from a number of *Star Hawks* spin-off projects that are currently in development. According to Goulart, "Some of the European outfits that bought the strip for newspapers also have magazine and book companies. In Italy, for instance, there's going to be a series of *Star Hawks* school tablets. Publishers in Italy and France want to reprint the strip in books. There's also interest in Italy in doing an animated television series. In this country, Tempo Books will publish a series of paperback reprints of the strip, including all the Sunday pages. I'll hopefully be writing some novels based on the strip, to be published by Playboy Press. Also, a large talent agency is presently involved in developing the strip as an animated TV series for Saturday mornings."

In the final analysis, the fate of these subsidiary projects rests in the continued success of the *Star Hawks* strip. The danger exists in the possibility that the strip might fold once the science-fiction boom tapers off, but Goulart is confident that that won't happen. "We think that, with any luck, we've got enough going for us to last. We have a two-year contract, with an

Jaxan and Chavez embark on yet another spaceage adventure. On of the biggest problems Goulart and Kane have found in presenting these futuristic exploits is censorship. "We can't even do what *Three's Company* does on television."

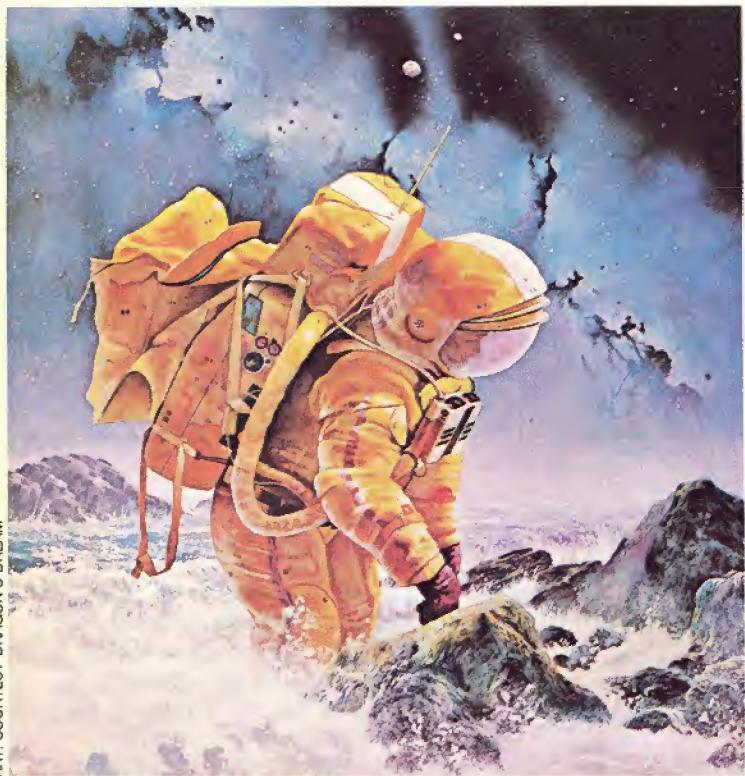
option for five beyond that. So barring unforeseen circumstances, we'll last at least through 1979. We feel that we do a product that isn't just based on a fad.

"I can see myself continuing to write the strip for 20 years—if the financial rewards are sufficient. After a certain point, though, you can't keep doing it just because it's fun. I'm not saying that I'm going broke on it, but from what I gather, you have to do a strip for about a year before it really starts to pay off. Because of the subsidiary projects, and because we've supposedly built up a considerable amount of money in Europe which hasn't found its way over here yet, the strip should be worth the gamble. If those possibilities don't come through, then in a couple of years we might have to reappraise the situation."

Kane and Goulart, perhaps as a hedge against that eventuality, are continuing with their other SF projects. Kane has drawn a two-volume adaptation of John Jakes' forthcoming novel, *Excalibur*, to be published by Dell. Goulart continues to turn out books at an impressive rate. Forthcoming from D.A.W. are *The Wicked Cyborg* and *Hello Lemuria, Hello*, and in February 1979, Doubleday will publish his *Cowboy Heaven* as its featured science-fiction title for the month. In addition, Goulart will be scripting a number of comic book adaptations of his short SF stories for Rick Marshall's special projects line of magazines from Marvel Comics.

Whatever the future may hold for *Star Hawks*, one thing is certain. Concludes Goulart, "At least now if somebody writes a book about the comic strips of the 1970s, we'll be in it—even if it's only as a footnote."

ART: COURTESY DRAGON'S DREAM

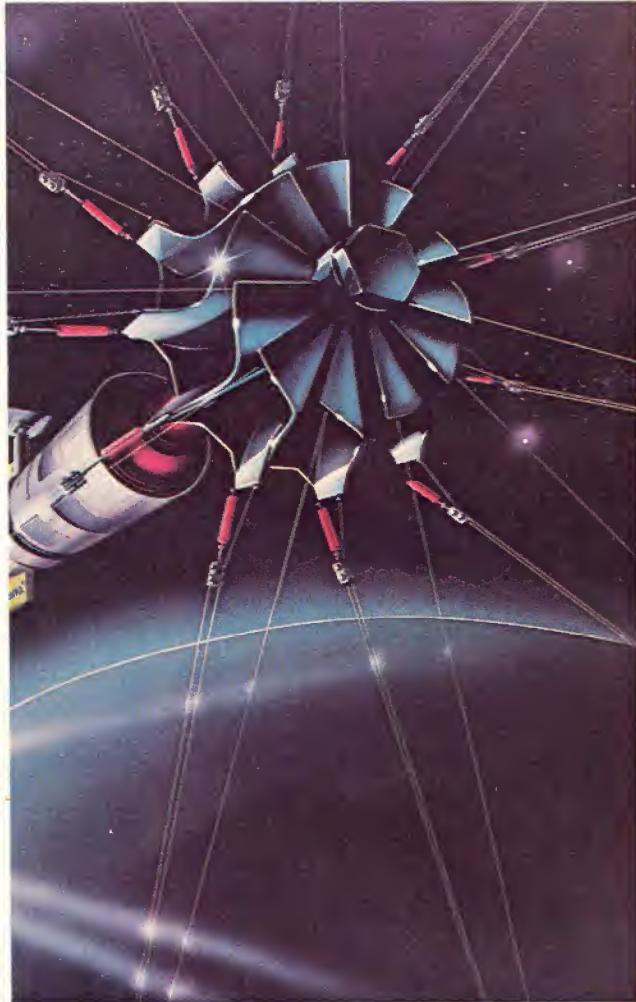


This lost astronaut is among one of 200 color illustrations in A&W's *The Flights of Icarus*. Others include spacey landscapes, incredible machines, wizards, dragons and robots.

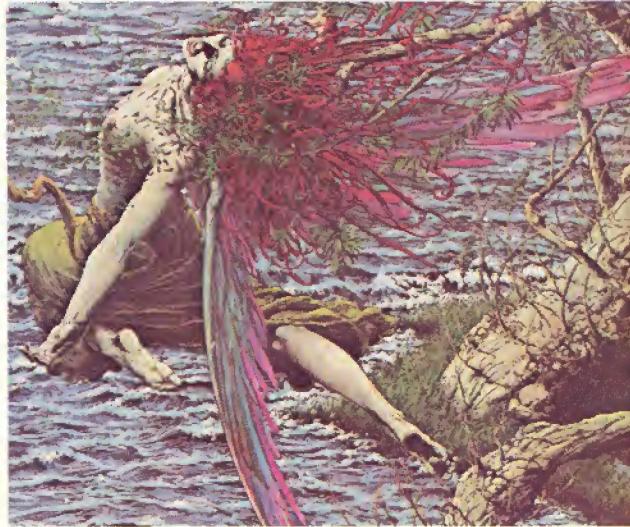
ART: COURTESY DRAGON'S DREAM



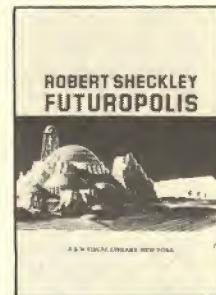
The cover of *Icarus*. The concept stems from the ancient myth in which Icarus plummets from the heavens to Earth. More than 30 artists interpret what went through his mind during the fall.



A detail from a painting by Philip Smith in *Masterpieces of Science Fiction*. This piece illustrates Arthur C. Clarke's "Sunjammer," the story of a "sailboat" race through space.



From Ariel: *The Book of Fantasy Vol. 3*. "The Devil's Lake," by Barry Windsor-Smith, is a dramatic departure from his famous barbarian-type paintings.



SF Artbooks and Illustrated Fantasies

By BOB MECOY

Comics, pulps, paperback covers — these elements form an extraordinary history of science-fiction and fantasy illustration that can be traced back to the debut issue of the first SF pulp published over a half century ago. After years of neglect, science-fiction and fantasy illustrators are finally getting the recognition they deserve as illustration is spotlighted in high-quality, large-format books.

This Christmas there will be a feast for the eye of the SF aficionado. The surprising success of illustrated SF and fantasy last Christmas convinced publishers that SF and fantasy fans will pay dearly to see what they love to read about.

Mention a successful publishing trend and you'll find Ian and Betty Ballantine at the head of it. In the 1950s they were the paperback science-fiction market. During the last few years they've collected and published the work of the great fantasy illustrators, including Arthur Rackham, Howard Pyle, Kay Nielsen and Frank Frazetta.

Though Frazetta's brilliant paperback covers sold literally millions of books, the response to the first collection of his work still surprised everyone. It became an instant collector's item. And the second collection did the same. This fall brings *The Fantastic Art of Frank Frazetta — Book Three* (Peacock Press/Bantam, \$ 7.95), another testament to Frazetta's mastery at catching the vein-bulging hero at that moment of most intense action or one of his incredibly voluptuous heroines in direst peril — all portrayed against the shadowed background that is his trademark.

The surprise bestseller of last Christmas was *Gnomes*, a beautifully illustrated "fantasy/fact" book about those mythical creatures. A Dutch book, the Ballantines found it abroad and Harry N. Abrams

published it. It was a coffee-table book that broke the rules by zooming up the bestseller list.

This year the Ballantines hope to repeat their success with *Faeries* (Harry N. Abrams, \$14.95), illustrated by Brian Froud and Alan Lee.

The book is a faerie identifier, a handsome field guide picturing all "known" varieties in over 200 color paintings and detailed drawings. Information on the haunts, pleasures and physiognomy of water faeries, elves, gnomes, pixies, leprechauns, tree faeries, dryads and all the rest are drawn from Celtic tales, English writers and Irish poets.

Faeries is a flight of fancy that demands belief and guarantees relief from the everyday world.

A & W Publishers had their own best-selling book of illustrations last year, the *Album Cover Album*, edited by Roger Dean and Hipgnosis. This year they turned Dean loose on a book of his own art, *Views* (A & W/Dragon's Dream, \$10.95).

Dean, awarded Best Artist honors at the 1977 World Fantasy Awards, is best known for his album covers for Yes, Rare Earth, Uriah Heep and other rock groups. *Views* should establish him as a designer of possible, if fantastic, futures.

This book collects not only his famed album covers and fantasy illustrations but his posters, sketches and furniture, architectural, urban and stage designs as well. Dean creates a world in which the evolution of animals and electronics are no longer separate; a world where your home may simply grow from the ground. He shows us nuclear-powered insects, fish swimming in air and knights on cyborg chargers: the familiar object changed. It is an exceptionally 'strange and beautiful book.'

The Flights of Icarus (A & W visual Library, \$12.50) looks through the eyes of the first human casualty of flight. Icarus

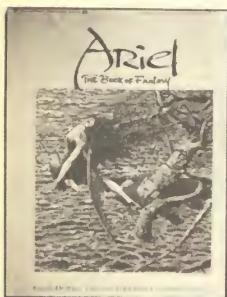
was the son of Daedalus, the mythical maze maker and inventor of the axe, saw and the wings that bore Icarus aloft. Disregarding his father's warnings, Icarus flew too near the Sun and fell — a long seven minutes — to Earth.

Icarus inherited his father's powers of invention and as he fell he had a vision (the editors propose) that spanned all the possible futures of human flight. Roger Dean, Donald Lehmkuhl and Martyn Dean have collected the work of over thirty contemporary artists to try to show what passed through the mind of Icarus during his fall. Over 200 lavish color illustrations show visions of space, unearthly landscapes, incredible machines and a universe of dinosaurs and dragons, wizards and robots.

Science fiction is an attempted history of the future. In *Futuropolis* (A & W Visual Library, \$7.95) SF luminary Robert Sheckley gathers the predictions of SF writers, filmmakers and visionary architects about the fate of the city.

The book offers a dazzling array of both literary and visual versions of possible urban environments to come. Within *Futuropolis'* 120 pages, the various shapes of the city of tomorrow change with quicksilver ease. The vast metropolis with its gigantic buildings connected by suspended roadways meshes with visions of floating cityscapes soaring through the skies. For hedonistic futurists there may be fun cities constructed thematically, like Disneyland — one author even suggested that our descendants might recreate the cities of our time just for fun. Sheckley surveys writers from Asimov to Orwell, filmmakers Lang to Kubrick and architects da Vinci to Paolo Soleri, listing all the fancies that may become fact.

According to *Lone Sloane/Delirius* (A & W/Dragon's Dream/Heavy Metal, \$9.95), in the very distant future Earth and its cities will lie forgotten and humanity



will have one hero left — Lone Sloane. Philippe Druillet records the epic adventures of Sloane as he battles mad gods and the degenerate rulers of the Imperium in the pages of this incredibly classy comic book.

Druillet is one of Europe's most popular fantasy and science-fiction illustrators and this marks the first time the adventures of his favorite hero have been presented in book form in English. Anything but a panel-to-panel-left-to-right storyteller, Druillet's inventiveness leaves the reader breathless as he reveals the truly cosmic visions of his imagination.

Armand Eisen and Thomas Durwood, publishers of Ariel Books, have high hopes for that company's standardbearer, *Ariel: The Book of Fantasy* — "We want it to be the *ultimate* in fantasy!" With fiction by Michael Moorcock, Harlan Ellison and Larry Niven; art by Tim Conrad, Bruce Jones and Al Williamson; and interviews with Frank Herbert, Barry Windsor-Smith and a midwestern farmer who tells of his other life as a prince of Atlantis, *Ariel: The Book Of Fantasy, Volume III* (Ariel/Ballantine, \$7.95) lives up their aspirations. VOLUME IV (Ariel/Ballantine, \$7.95) continues this new tradition of excellence with an Asimov profile, poetry by Ray Bradbury, fiction by H. G. Wells and much more, all illustrated by the best young artists and photographers in the field.

Masterpieces Of Science Fiction: Voyages Through Time And Space (Ariel/Ballantine, \$7.95) is a masterpiece. With nine stories by the very best in science fiction — Asimov, Bradbury, Benford, Clarke, Ellison, Heinlein, Herbert, Van Vogt and Vonnegut — all illustrated magnificently, this book is what the pulps could have been if they had had Rockefeller's money.

These stories were published in *Collier's*, *Amazing*, *Astounding* and *Analog* between 1939 and 1970 and every one is a classic. They are the kind of stories that create SF addicts. If there's anyone you want to convert, this is the book to give them.

Books in Brief

Star Well The Thurb Revolution Masque World

All by Alexi Panshin

(All \$1.75 in paperback from Ace)

These three books chronicle the adventures of Viscount Anthony Villiers, black sheep of Charteris. The gentle scoundrel and Torv^e the Trogg, his huge furry frog of a traveling companion, stumble into adventures all across the 34th Century galaxy. Each of the three books is a delight and, as a whole, the three show Panshin at his best. Good news for those who already know Villiers' adventures—Panshin has promised the fourth volume sometime soon.

The Face in the Frost

By John Bellairs

(\$1.75 in paperback from Ace)

Only the strength of two reluctant wizards stands between the kingdom and chaos as madness sweeps through the populace. Ursula Le Guin calls this book "...authentic fantasy by a writer who knows what wizardry is all about."

A Different Light

By Elizabeth Lynn

(\$1.75 in paperback from Berkley)

A brilliant young artist is stricken with cancer. He will live twenty years if he stays in space-normal where his disease can be treated, one year if he pursues love and the different light of another star. His choice is obvious, but his end is an astonishment. Highly recommended.

Planetary Encounters

By Robert M. Powers

(\$12.95 in hardcover from Stackpole)

A generously illustrated history and future of human encounters with the other planets of our solar system, from Copernicus to current exploration by robot spacecraft. Up-to-date information on all the planets and the hardware used to explore them, plus a preview of future voyages. Well-written and enlightening.

The Martian Inca

By Ian Watson

(\$1.95 in paperback from Ace)

A Soviet spacecraft crashes in the Andes, spilling its fresh Martian soil sample and triggering an evolutionary leap in two Indians exposed to the red dirt. Meanwhile, a manned American spacecraft makes its way to Mars for the purpose of terraforming the planet to make it livable for humans...unaware of the potential effects of contact with the soil.

Science Fiction: Contemporary Mythology

Edited by Patric K. Warrick, Martin Harry Greenberg and Joseph Olander
(\$14.95 in hardcover from Harper & Row)

A serious SF devotee's dream-come-true, this laudable anthology presents the ten major themes in contemporary SF and illustrates them with both an essay and a story. Among the authors offering both critiques and fictional excursions into SF are Isaac Asimov, J.G. Ballard, Arthur C. Clarke, Fred Pohl and Ursula Le Guin.

Altered States

By Paddy Chayefsky

(\$8.95 in hardcover from Harper and Row)

At last! Film and TV author Paddy (*Marty*, *Network*, *Hospital*, *Middle of the Night*) Chayefsky's first novel. Renowned for his insight into human nature and slice-of-life dialogue, Chayefsky abandons both in this cosmic Jekyll and Hyde tale. A scientist attempting to find the origins of consciousness uses mind-altering drugs and, eventually, shifts his own space and time...causing not only his mind to change but his physical shape as well.

The Science-Fiction Awards Guide

Movies have their Oscars. TV has its Emmys. But science-fiction literature has enough awards to boggle the mind of any fan.

By MICHAEL CASSUTT

Hugo ... Jupiter ... Gandalf ... Nebula ... Ditmar ... Skylark ... what's this? Replacements for Snow White's dwarfs? Darth Vader's shopping list?

If you are a fan of the genre you might recognize some of the names. They're awards ... some of the dozens given every year by science-fiction and fantasy organizations and fans around the world.

Indeed, awards aren't unique to the SF world. Movies win Oscars, TV shows get Emmys, National Book Awards are bestowed upon deserving works of literature, writers of western stories have their Spur and mystery writers their Edgars. But it's safe to say that the world of science fiction and fantasy is second only to the world of sports in its enthusiasm for giving awards.

SF awards are, in fact, almost as old as modern science fiction itself, which is generally chronicled from 1926 and the founding of *Amazing Stories* magazine by Hugo (remember that name) Gernsback. The first awards were completely informal, infrequently given and, today, all but forgotten.

According to Forrest J. Ackerman, winner of the very first of the now-established Hugo awards, readers occasionally conducted polls in fan magazines to choose the most popular novel of the year. From time to time, awards were handed out at conventions, such as the 1941 World Convention in Denver. SF historian Sam Moskowitz says that the first of these polls took place in 1933 in the pages of the young Ackerman's *The Time Traveller*, one of the first fanzines. The readers picked the best "serial" published in the preceding year. (It had to be a magazine serial because SF books as we know them today were all but non-existent.) The winner was the classic *When Worlds Collide* by Edwin Balmer and Philip Wylie, competing with stories by the likes of Edgar Rice Burroughs, A. Merritt, John Taine and others. These awards were one-time affairs devoid of the later splendor such as banquets, trophies, cash prizes, et. al.

Obviously, times have changed. One recent SF awards banquet was nationally

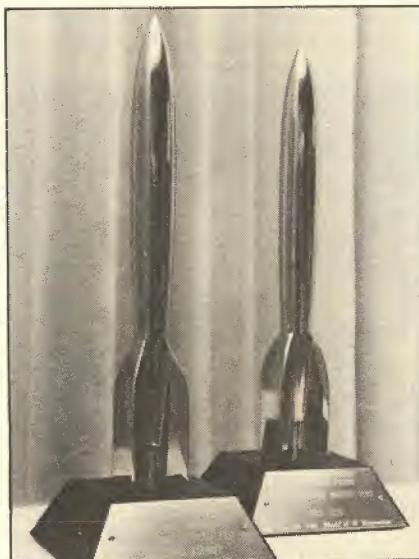


PHOTO: JAY K. KLEIN

The oldest SF award, the Hugo.

televised. Publishers proudly proclaim Hugo and Nebula winners on book covers and promotional material. Fantasist Harlan Ellison, with a half-dozen Hugos and three Nebulas to his credit, says, "Every time I win an award, I can count on my price for a book going up by predictable and chartable increments. ... Awards are just popularity-contest tokens and I don't put much stock in them ... but ... when fans or professionals choose to select my work as meritorious, it would be gauche and shitty of me to refuse to accept the compliment."

This survey doesn't intend to debate the pros and cons of giving SF awards. Fans and readers do enough of that without prompting. But for those of you who have always wondered how a Hugo or a Nebula winner is chosen ... and for those who might want to win one, here's our Guide to Science Fiction (and Fantasy) Awards:

Hugos

The oldest continuing SF awards, and certainly the best known, the Hugos were first given as one-time awards at the Cleveland World Convention in 1953. They were revived two years later and have been given out every year since. Today the categories include best novel, best novella,

best novelette, best short story, best dramatic presentation, best editor, best artist, occasional special awards and several fan awards. The actual trophy is a statue of a spaceship. Nominations in the various categories are made by paid members of that year's World Convention, who also vote on the final ballot. The Hugos are awarded at a banquet during the WorldCon.

Nebulas

Established in 1966, the Nebula is unique among SF awards since it is given by writers rather than fans. Only members of the Science Fiction Writers of America may nominate and vote Nebulas, which are given in four categories: best novel, novella, novelette and short story. There is also a Grand Master trophy whose recipient is chosen by past and current officers of SFWA.

Physically, the award is a clear block of lucite in which a spiral nebula and glittering stone are embedded. The Nebulas are presented every April at a ceremony in either New York, Los Angeles or San Francisco, and the winning short fiction is published annually by Harper & Row.

Science-Fiction Film Awards

Presented by the six-year-old Academy of Science Fiction, Fantasy and Horror Films; the SF Film Awards are the most ambitious of all the SF honors, both in scope and in sheer number. According to the Academy's founder, Dr. Don Reed, "We want to do for science fiction, fantasy and horror films what the Academy of Motion Picture Arts and Sciences does for general films."

The Academy is composed of numerous committees, each reflecting a single area of interest such as acting, music or directing. The committees themselves are made up of one-third professionals in the field, one-third academics and one-third fans. They screen films during the year (free screenings are available to members in the Los Angeles area) and select the winners. Among the professional members of the Academy are directors George Pal and Martin Scorsese, and writer Jerry

World Fantasy Awards

Founded in 1975 and patterned after the Hugos, the World Fantasy Awards are given in the categories of best novel, best short fiction, best book (single author collection or anthology), best artist, life award and special professional and non-professional awards. Nominations are made by members of the World Fantasy Convention and by a more-or-less permanent committee. The physical award is a bust of H. P. Lovecraft designed by cartoonist Gahan Wilson. Writer Charles L. Grant, a member of the committee, says, "We call it the 'Lovecraft.' There's an underground movement calling it the 'Howie,' but we try to ignore it."



Above left: L. Sprague de Camp accepts the First Fandom Hall of Fame Award for Frank B. Long, presented by Jay Kay Klein. Right: Fritz Leiber accepting the 1976 "Howard" from C. L. Moore and Gahan Wilson for his short work of fiction "Belson Express."



Left to right: the Gandalf Award, the Grand Master Nebula and the Derleth Award.

Pournelle.

The SFF Award is a 12-inch-high statue of Saturn, with "rings" made from 35 mm film. The awards banquet, held in January, is a big-time event. The 1978 show was televised over KTLA-TV in Los Angeles and syndicated nationwide. Presenting the awards were such notables as Mark Hamill, William Shatner, Ray Bradbury, Charles Conrad, Edwin Aldrin and George Burns. Memberships are open to anyone and are tax deductible. Contact Dr. Don Reed, 334 W. 54 St., Los Angeles, CA 90037.

John W. Campbell Memorial Awards

Given for best novel of the year, with an occasional retrospective or special non-fiction award, the Campbell Memorial Awards were founded in 1973 in honor of the late John Campbell, once an editor of *Analog*. Nominations are made by publishers and presented to a committee that includes writers Brian Aldiss, James E. Gunn and several academicians. Selec-

tion of the Campbells is informal. "We correspond about books we think are worthy," says Gunn, "then we all cast ballots which are assembled by the chairman."

The Campbell Memorial Award itself is a metal moebius strip. There is, however, a permanent awards ceremony; the 1978 Campbell was given to Frederick Pohl at an international SF writers conference in Dublin last June. Past winners have included Clarke's *Rendezvous with Rama*, Dr. Carl Sagan's *The Cosmic Connection*, *Beyond Apollo* by Barry Malzberg and *The Alteration* by Kingsley Amis.

John W. Campbell Award — Best New Writer

Not to be confused with the Campbell Memorial Award, the Campbell New Writer Award is a plaque given to a writer whose first work was published in the previous two years. It's sponsored by The Conde Nast Publications, owners of *Analog*. The New Writer Award appears on the Hugo ballot and is awarded, like the Hugo, by members of the World SF Convention.

Gandalfs

Since 1974, the Gandalf nominees, like those for the New Writer Award, have appeared on the Hugo ballot. Categories include best fantasy novel and lifetime achievement. Winners have been the late J. R. R. Tolkien, Fritz Leiber, L. Sprague de Camp and Andre Norton.

Jupiters

Awarded by the Institute of Science Fiction in Higher Education (ISFHE) since 1973 in categories similar to the Nebula, Jupiter Award nominations and votes come from university and high school teachers of SF and fantasy. The Jupiters are administered by Dr. Marshall B. Tymn, of the English department at Eastern Michigan University, Ypsilanti, Michigan.

Foreign Awards

SF Awards aren't restricted to the U.S. of course. There are numerous awards given for both books and films. They include the Australian Ditmars, France's Prix Apollos, the Golden Asteroids of the International SF Film Festival, the British SF Awards, the British Fantasy Awards, Sweden's Jules Verne Awards, the Grand Prix of the Avoriaz Fantastic Film Festival and many more.

Fan Awards

This is actually a misnomer, since all but two of the awards described here are "fan" awards. But there are many awards given by SF clubs or regional conventions that few people outside the SF community hear about. They include the E. E. Smith (the Skylark) Award of MIT's SF club, the Forry (as in Ackerman) Award given by the L.A. Science Fantasy Society, the award given by the Count Dracula Society, the new Fritz Leiber Award for fantasy and the recent Andre Norton Award for outstanding achievement in SF by a woman. As well, a First Fandom Award and a Big Heart Award are given at every World SF Convention.



Apple II

By Apple Computer, Inc. Personal Computer with color graphics. Suggested retail price: \$970.00

As the market for personal computers grows, so does the number of manufacturers entering the field. Each manufacturer hopes to offer something a bit more unique than his competitors in order to capture a share of the market. Such is the story of color graphics and personal home computers.

The Apple II system is, according to the manufacturer, the industry's first self-contained personal computer. By this they mean that it is fully assembled and pre-tested and is ready for use the moment it is unpacked. The consumer need only connect Apple II to any standard television set using an inexpensive RF modulator, and it is ready to perform.

The TV screen serves as Apple II's output, displaying in full alpha-numeric characters and video graphics in 15 colors. The input to the system is accomplished on an alpha-numeric keyboard built right into

Apple II's molded case. In fact, the whole unit looks amazingly like an ordinary, portable electric typewriter, except there is no paper carriage.

The system also provides interfacing for a standard audio cassette recorder/player, which can be used for storing and loading programs, or data and input/output connections for "game paddles" and other types of game controls when the system is used for entertainment purposes.

There are four models of the Apple II system with varying amounts of memory storage. For \$970.00 you get 4K bytes of RAM. (Up to 48K bytes of RAM are available.)

Apple II displays memory on the television screen as either text (24 lines of 40 characters), color graphics (40" wide X 48" high resolution—15 colors) or high resolution graphics (280" wide X 192" high—four colors: black, white, violet, green). In both the color graphics mode and in the high resolution graphics mode, four lines of text may optionally be displayed at the bottom of the screen. This allows you to give game instructions, label graphics or have the computer ask you questions.

The Apple II system includes a rugged, molded case, typewriter-style keyboard with N-key rollover, high-efficiency switching power supply, ROM-resident BASIC interpreter, monitor, assembler and dissembler, two game paddles, demonstration programs on tape cassettes, AC power cord, cassette cable, reference manual and BASIC manual.

The Renaissance Machine

By Intelligent Systems Corp. Personal computer with color graphics. Suggested retail price: \$1,495.

Compucolor of Norcross, Georgia, is billing its latest entry into the color graphic personal computer market, the Compucolor II, as "The Renaissance Machine—The personal computer for the modern Renaissance Man."

This computer, while apparently priced higher than the Apple II system, includes a good deal of hardware that is only available from Apple at extra cost. The computer is available in five models (4K to 23K RAM depending on the model). It has its own eight-color, 13-inch diagonal display, a typewriter-like keyboard with 3-key rollover, 8080A CPU, and the only built-in, high-reliability mini-disk drive mass storage device available on a home com-

puter. The Compucolor II utilizes BASIC 8001, a conversational programming language with English-type statements and familiar mathematical notations.

In addition to the normal program for checkbook balancing, etc., Compucolor has developed a complete games library on diskettes designed to take advantage of the computer's advanced color graphics capability—Star Trek, Blackjack, Chess, Checkers, Othello, Biorythms and other computer games.

The Model 1 with 4K of RAM and 16 lines of text retails for \$795. The Model 3, whose capabilities are most similar to the Apple II system, retails at \$1,495.00 (Again, the package from Compucolor includes more hardware than the Apple system.)

All models are capable of 64 characters per line and include a 72-key keyboard, a 13-inch color CRT with a built-in single mini-disk drive.



The Compucolor II has its own 8-color, 13-inch diagonal built-in display.



ART: JET PROPULSION LABORATORY

NASA's Planetary Invasion Plans:
Exploring the Solar System in the 1980s

By JAMES OBERG

America's program of exploring the solar system will shift gears with the beginning of the space shuttle era. Up until the latest Venus probes (launched this year and due for encounter in December), our robot explorers were launched by expendable rocket boosters in the Thor, Atlas and Titan families.

There will be a three-and-a-half year gap between last August's Pioneer-Venus 2 and the launch of the next interplanetary



probe—Galileo.

Galileo, a combination orbiter and atmospheric probe for the planet Jupiter, will be the first interplanetary explorer launched from the cargo bay of the space shuttle.

Several years ago, in anticipation of the space shuttle era, NASA prepared a "menu" of possible robot explorer missions for the 80s. The possibilities ran into the dozens, with realistic proposals to map, land on, probe, rove about, penetrate and return samples from every planet except Pluto and several interesting

moons—Io and Ganymede of Jupiter, and Titan of Saturn. Other proposals were rendezvous with and sample returns from asteroids and comets, spacecraft to observe and measure the Sun from every angle and an out-of-the-ecliptic solar system escape to sample the interstellar medium.

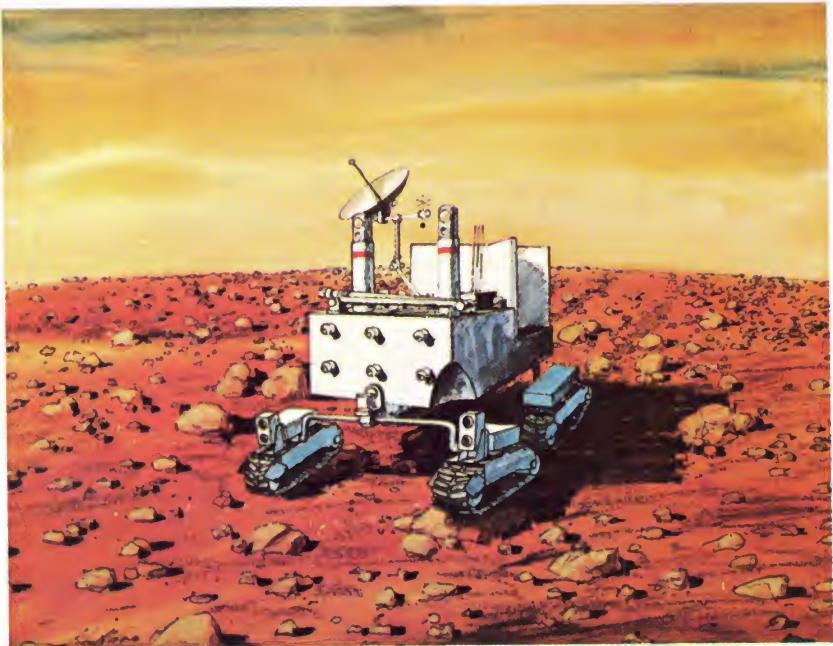
No gourmet ever had a more enticing menu, but nobody eats everything on the menu—even if they can afford it! So NASA whittled down the list to the probes with the most challenging scientific exploration programs. Three candidates

Above: a key moment in the flight of Galileo, the orbiter and probe scheduled to arrive at Jupiter in 1984: the red-hot nose cone separates from the probe as it parachutes in to sample the gas giant's atmosphere. Galileo will be the first interplanetary spacecraft launched from the shuttle—in 1982.

Opposite page, above: a Viking-type lander descends to the frozen surface of Titan, the Earthlike moon of Saturn, to search for possible life forms. Opposite page, below: ion-propelled spacecraft shoots a probe at Halley's Comet, 93 million miles from Earth.



Left: Solar Polar spacecraft draws near the Sun on its flight over the pole. The Sun and its corona are shown as seen by instruments on the craft. It will sample interstellar space at high latitudes. Below: the Mars Rover, designed by the Jet Propulsion Laboratory, as it makes its way across the surface of the red planet. The intelligent Rover can operate independently of detailed instructions from Earth, with a "science alarm" to alert Earthlings of important discoveries.



ART: JET PROPULSION LABORATORY

emerged: 1) Galileo, the Jupiter orbiter and probe, is already funded and approved. 2) Also approved and in advanced planning is an out-of-the-ecliptic probe, newly renamed as the Solar Polar Orbiter. 3) Not yet approved, but with encouraging study funding now granted, is a comet probe that will visit Halley's comet and later land on comet Tempel II.

As work on the Galileo hardware progresses, every pound of weight is critical. Even with a gravity assist from Mars now plotted into the mission (to save on rocket booster weight), Galileo may still be slightly overweight to be carried up in the shuttle. The Mars maneuver will also increase the length of time it takes for Galileo to get

from here to Jupiter.

Galileo is to be launched in January of 1982, then fly by Mars the following April. From then on, it's a slow coast up and out to Jupiter, with arrival slated for July of 1985.

There the entry probe will spring free of the mothership and plunge into the turbulent, multi-colored, baffling Jovian atmosphere. Data relayed back to Earth during the probe's half-hour descent into the gas giant will tell us much about the biochemical and physical make-up of Jupiter.

The mothership will steer into a safe Jovian orbit, looping month after month through Jupiter's satellite system and

sending back high-quality photography of the inner moons. Weather on the planet itself (is there weather on any of the moons?) will be watched for an entire Jovian "year," and the planet's radiation belts and magnetic fields will be carefully mapped. Galileo is planned to return information until 1990 or later.

Galileo will have company. Distant, massive Jupiter may become a sort of solar system crossroads for a variety of far-flung future space probes. Jupiter gravity assists will be used as a kind of "natural propulsion," to boost spacecraft into odd trajectories which normal propulsion systems aren't powerful enough to accomplish.

Following Galileo will be the Solar Polar Orbiter dual spacecraft, launched 13 months later (about mid-February, 1983). It, too, will head for Jupiter, although its real target is the space high above the Sun.

All planets and most asteroids follow the same plane in their orbits around the Sun. This plane also is close to the solar equator, so the solar winds and fields detected by Earth-based and space-based instruments are those generated in the Sun's equatorial regions. Actually, the higher solar latitudes are more active, and probes of winds and fields expelled from those areas could reveal much. In addition, the space over the Sun's poles may be the regions in the solar system where the interstellar fields, low-energy cosmic rays and galactic dust come closest to the Sun.

So scientists want to sample the space "outside the ecliptic." But spacecraft launched from Earth have Earth's own forward velocity, and if they are targeted to other planets, they spend all their energy moving in or out but *not* above or below the ecliptic plane. A direct brute force approach to "turning a right angle" in solar orbit is not possible except with breakthroughs in solar sails or ion drive engines, and those systems remain to be perfected.

Jupiter provides the answer. A space probe launched outward to Jupiter and directed over its polar region will be yanked right out of the ecliptic plane and shot straight up above it. It would then soar back down towards the inner solar system, passing over first one pole of the Sun and then the other.

That is the flight plan for the Solar Polar Orbiter—actually two spacecraft, one built by the U.S. and one built by the European Space Agency. Their five-year mission will begin in 1983 and see a 1985 Jupiter encounter (before Galileo arrives!). One probe will head south and one north, complimenting each other's readings. They will be nearest the Sun in 1987 and will send at least a year of good solar (and hopefully interstellar) data.

Next on tap is the 6000-pound comet probe, as yet without any catchy name, but with a particularly difficult "catch-

(Continued on page 55)

John Berkey

Science-fiction fame came as a surprise to artist John Berkey. The North Dakota-based painter probably would have been entirely happy doing the landscapes, industry and advertising art that initially brought him attention, but his colorful work on *The Towering Inferno*, *King Kong* and other posters interested the SF community.

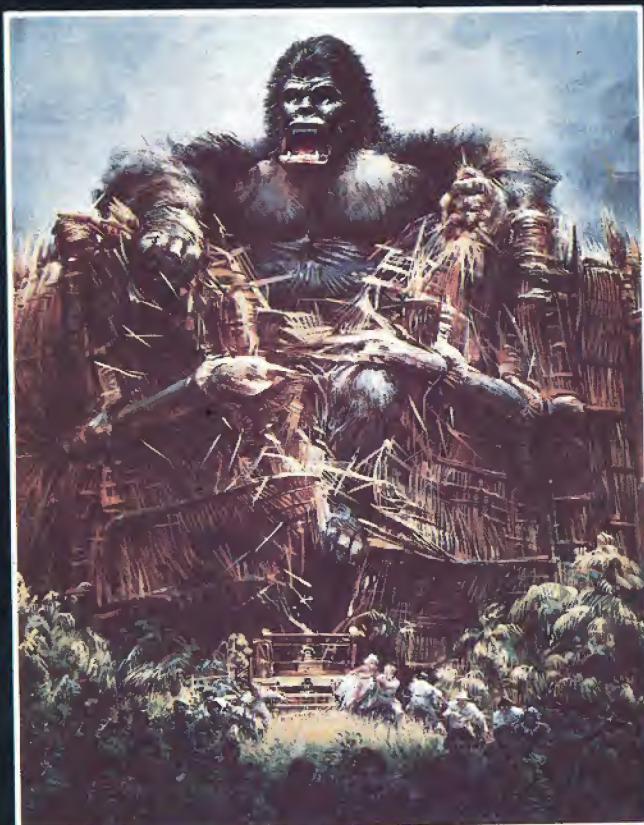
Soon his sleek and vibrant spaceships were gracing the covers of many paperbacks and posters. His sweeping, furious artwork for the *Star Wars* Corporation, which was included in the soundtrack-album package, is just one of the more recent additions to his SF notoriety.

"I've never looked at myself as a science-fiction artist, as opposed to being just an artist," says Berkey. "I enjoy doing it, however, and the fine reaction has something to do with my way of thinking about it. I'm not going to say that science fiction is easier to paint, but it is something I can do."

And he does it with a crystalline beauty that many admire and some even mimic. His streaks of color and seemingly brittle edges add a certain speed and airless atmosphere to his space scenes, an effect Berkey is aware of but not particularly obsessed with.

"It's basically a picture—an illusion—of something that doesn't exist," he explains. "I can't make it that technical or else it would lose all the excitement. They are basically light studies. I'm not an engineer and I don't do extensive research. I just sit down and do it."

Essentially, Berkey considers himself a professional painter, and within that definition, does not limit himself to one style or genre. He is as at home in the cabin of a New England fishing



boat as he is behind the wheel of

a vintage touring car, climbing the grassy hills of a sleepy midwestern town, or piloting a futuristic craft to an uncharted planet. The craft he painted specifically for Warner Books' paperback version of T.A. Heppenheimer's *Colonies in Space* should hold a few surprises for Berkey fans. His love of detail and interest in seafaring ships is evident in this unique interpretation of a space colony. (See centerfold.)

What isn't evident on first viewing is the thought that went into the project. "There were two different units the publisher was interested in seeing," Berkey remembers of the commission he completed last October. "One that we would think of as being stationary, even though it was moving—a space station—and a huge ship that obviously moved. Eventually, the former idea was discarded, so I had to have movement within the ship and give a direction to the actual ship. It was a way of combining

both the space station and the spaceship."

What was finally delivered to the satisfaction of Warner was an outer-space luxury liner, complete with futuristic "life-boats." The two planets that flank the craft could be Earth and its Moon—or any other pair of planets and satellite.

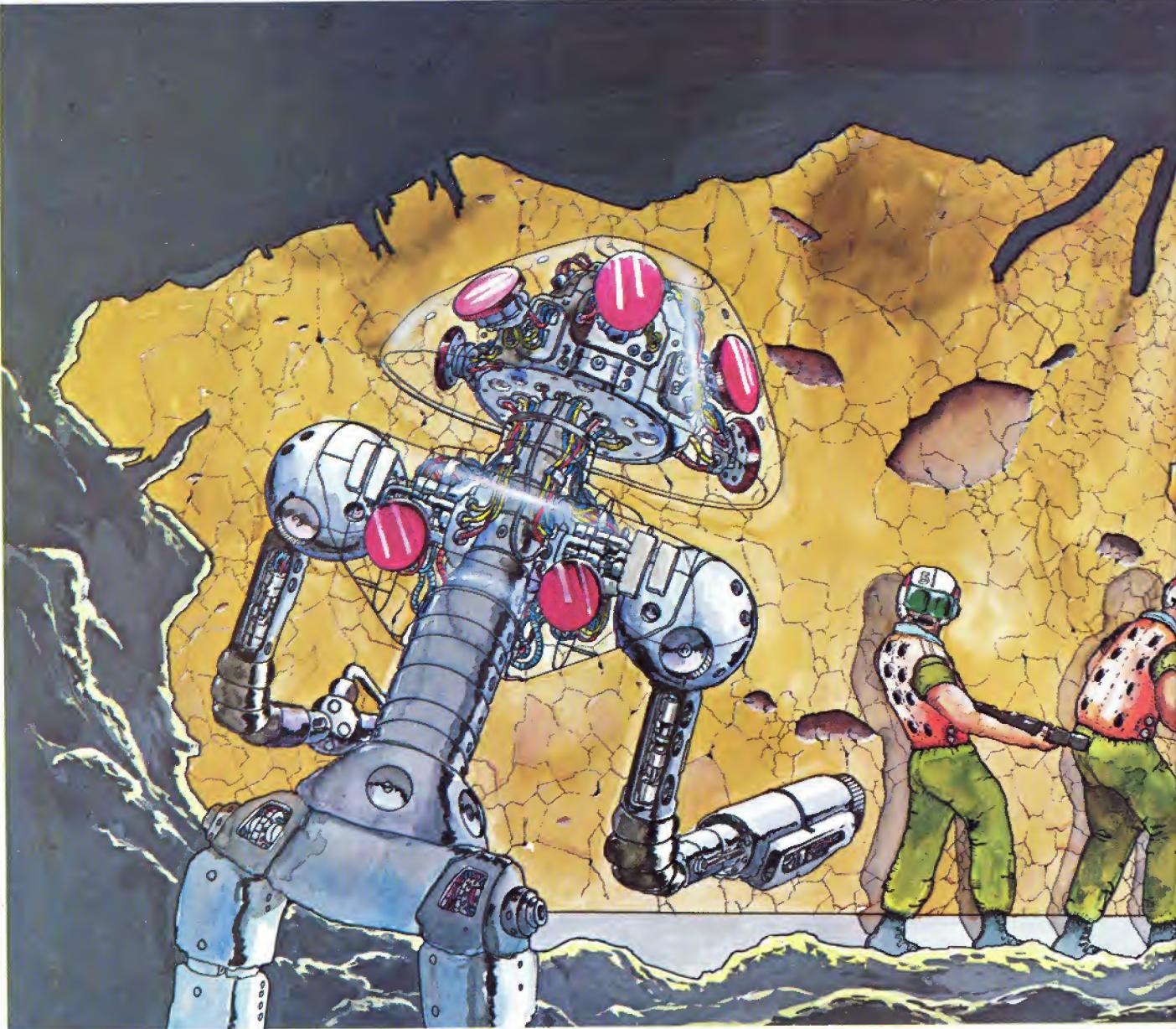
"I can't visualize these paintings before I do them," says Berkey in addressing the nebulous side of his artwork. "I start with an idea and build on it. Things have to work with other things as you go along. I wish there was an easier way for me to do them, but I've got to sweat them out, so to speak. It's easier to picture the familiar in your mind, set it up and then paint it, but with these, you just have to let them happen."

Above: a Berkey vision for the 1976 *King Kong*. On the following spread he creates a futuristic craft for *Colonies in Space*.





BERNEY



Realtime: SF Game of Tomorrow?

It combines the military appeal of war games, role-playing aspects of the new SF enthusiasm and space-age technology.

By DAVID HOUSTON

Board games of strategy and tactics ... battles in three-dimensional outer space ... an increasing disinterest in typical movie and TV fare ... electronic tests of skill and ingenuity for home and amusement arcades ... computers for home use ... target practice with bullets of light ... the exploding popularity of science fiction ... where is it all leading?

Vincent Hollier, a Los Angeles inventor, believes he knows. With partner Andrew Woolfolk (a member of Earth, Wind and Fire) he has invested eight months and almost \$10,000 developing a prototype system he calls Realtime. It combines the military appeal of war games, role-playing

aspects of new enthusiasms like Dungeons-and-Dragons and space-age technology; it takes into account the increasing popularity of science fiction and the modern emphasis on physical activity — and the result is a sort of mature, good guys-bad guys shootout played with "real" lasers and functioning, high-powered devices.

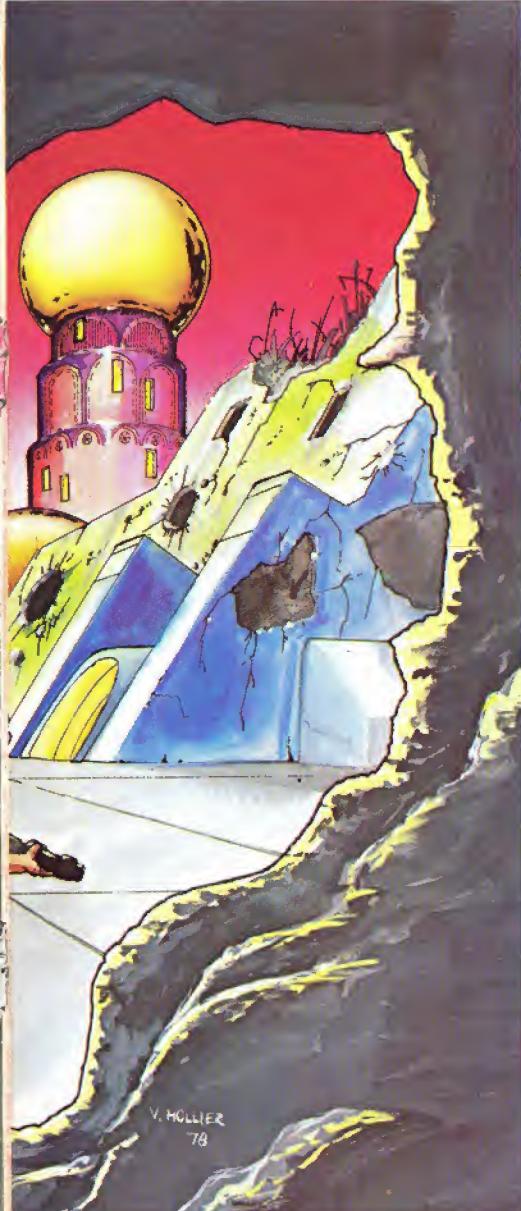
"Realtime," says Hollier, "is a system designed to simulate man-to-man combat in a futuristic context that ranges from an Earthlike environment to the vacuum of a barren asteroid."

Some of his inspiration came, he says, from systems in use by the military and NASA — things like the various flight simulators for pilot training and personal combat trainers using "direct-fire" lasers. "Those things aren't just useful," he ex-

plains, "they're fun." But so far they have been inaccessible to the general public.

Hollier's wife Susan (also a participant in the project) adds, "If it weren't for all the death and destruction, war would be fun. Realtime gives you all the anxiety, the adrenalin, a sense of victory or defeat — without the disaster."

A player is equipped to the teeth. He or she wears something resembling battle fatigues. The vest is dotted with light sensors which register pin-point "hits" from enemy laser fire and convey a "destruct" signal to a bright blue strobe light attached to a shoulder; simultaneously, the signal deactivates the loser's weapon. The molded fiberglass weapon contains a battery pack, a noise "blaster," groups of light-emitting diodes which count off the time



ART: VINCENT HOLLIER

PHOTO: DAVID HOUSTON



Left: Vincent Hollier's portrayal of the SF game of tomorrow. Above: Hollier and partner demonstrate the Realtime prototype. The molded fiberglass weapon contains a battery pack, a noise "blaster," a row of LEDs for timing and recording the number of shots and the infrared laser.

photocell.

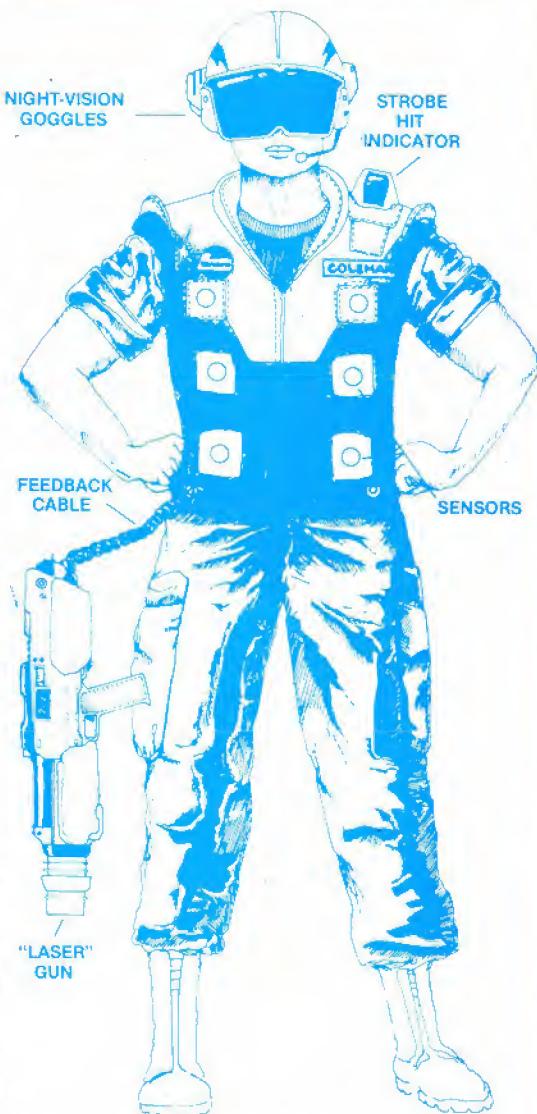
Hollier admits the system will be costly. He envisions Realtime first spreading through amusement parks and arcades, where a would-be player rents equipment, joins a team, gets his "orders" and enters an enclosed, dark battlefield maze. "An old warehouse would be a dynamite place to set one up," he contends. Only economics and imagination would limit the complexity and fascination of the battlefield environment.

It becomes clear, hearing the inventor talk, that he sees Realtime to be as much a game for adults as for youngsters. "If I hadn't invented it, I'd be the first one in line to buy a ticket!"

Although systems like Realtime will undoubtedly remain expensive, relative to other games, later models engineered for mass production ought to be accessible for private purchase by clubs and individuals. (Consider the dramatic drop in price of LED watches and pocket calculators in recent years.) Patents are pending, and negotiations are underway with potential exhibitors.

Vincent Hollier is a long-time SF fan. Among his other accomplishments, he's a painter of spacescapes and a model builder; he recently worked on the redesigned *Enterprise* for the new *Star Trek* movie.

"People are starved for the kind of entertainment that science fiction can give them. It whisks folks away from their dull routines to the outposts of the galaxy." Hollier has a hunch that in the future there will be much more individual participation in that "whisking away," and that games like Realtime might even give movies and TV a run for their money. ■



Above: the uniform-of-the-day for the Realtime player. The sensors register hits firing the "destruct" strobe on the player's shoulder and deactivates the loser's weapon. The helmet has night-vision goggles similar in effect to Luke Skywalker's macrobinoculars in *Star Wars*.

and the number of allowable shots remaining in the "charge," a microprocessing circuit (computer) and a safe, low-infrared laser emitter which can shoot either "buckshot" or an assassin's beam — a "bullet." The Realtime helmet has built-in night-vision goggles (like those used by Luke when he was looking for Artoo in *Star Wars*) and provisions for walkie-talkie and sound effects.

The player is part of a team of five that is pitted against another five-man force on a booby-trapped "battlefield" — where there is a specified objective, and the player has an assigned (or assumed) role to play. The booby traps are electronic versions of the Claymore mine — an anti-personnel device used extensively in Vietnam. In the game version, it isn't metal that goes flying when you take a wrong step and trigger the blast, it's *light* — a wide spray of beams, any one of which can activate a vest sensor and "disintegrate" you. The mine is tripped when a careless foot interrupts a low beam aimed at a

FUTURE INTERVIEW

Fabricating a New 25th Century for NBC's

BUCK ROGERS

An Interview with Producer Leslie Stevens



PHOTO: DAVID HOUSTON

By DAVID HOUSTON

Science-fiction images of the future are not just plucked out of thin air. In *The Time Machine*, H.G. Wells envisioned a distant time ravaged by war and dominated by barbarous mutants, while in his *The Shape of Things to Come* he allowed our posterity to overcome war and plague and struggle to aim for the stars. Books and films such as *Brave New World*, *1984*, *Metropolis*, *Fahrenheit 451*, *The Tunnel* and *Logan's Run* each interpret the glittering and potentially deadly future differently, but with certain haunting similarities. Novelists Asimov, Anderson, Heinlein and others have built calendars stretching many centuries forward, frameworks for their various tales of tomorrow. One creator of classics, Olaf Stapledon, has mapped the entire history of the Universe; his *Last and First Man* spans 2,000 million years!

Creators of these projections are not so mystical as to contend that their futures *will* be; their hope is that while absorbed in the story, their audience or readership will accept that the extrapolated future *might* be. It is the creation of a *realistic* tomorrow that many consider the science-fiction creator's most mysterious ability.

Leslie Stevens is currently in the process of such a creation. The talented television producer is currently helming NBC's upcoming *Buck Rogers* tele-series. It's Stevens' job to take elements from the vintage comic strip and adapt them to the TV format while, at the same time, selecting visual ingredients that will convince his TV audience that the story unfolding is in fact taking place 500 years in Earth's future. Sitting in his office at Universal Studios, the SF veteran (remember *The Outer Limits*?) explains the difficulties involved in unearthing the *Buck Rogers* legend.

"With *Buck*," he states, "you have to

get going from the old comic strip and serials and somehow wind up with plausibility. I distinctly remember carrying a *Buck Rogers* ray gun when I was about four, and going *zap* at things and hearing the gun *click* like a cricket. That was a big deal back then, but now we're faced with the primitive look of the original in sophisticated times. We don't want our *Buck Rogers* to be just a cartoon. We wanted to update it without going so far as to destroy the soul of it." The 1930s look of the 25th Century, therefore, was discarded.

A practical limitation had to be added before creativity could begin. "We have to be very different from *Battlestar Galactica*. Our supervisor, Glen Larson, is doing



PHOTO: ©1978 NBC



Galactica too, and he doesn't want any similarity — partly because there are lawsuits all over the place. It seems that everybody these days is claiming ownership of outer space. Obviously, though, everything now is going to be at least a remote cousin of *Star Wars* and *Galactica*.

"But to make sure *Buck Rogers* has a life and a style all its own, I added a basic notion, a past history. I assumed that there had been, on planet Earth, several great wars and periods of dictatorship, and now civilization was run by a council of computers. The machines were invented by our Dr. Huer, who made them to be as human as possible. But they tend to make the society uptight, a little prissy."

This vision of society was necessitated

by plot and character considerations. "Buck is supposed to be so loose and fun-loving that he breaks Wilma down, teaches her how to enjoy life. So, in effect, he enters a society doing a stylized minuet — and he wants to boogie."

This is the core concept to which all elements of 25th Century Earth had to conform — a free spirit entering a repressed society.

"I thought the way to show this would be to take the society of Edwardian England and extract design elements from it. This is all supposed to be subliminal, not literal. It's *spacey* Edwardian. If you look at the helmets of the fighters, you will see a point in front that curves down — like Bengal Lancer helmets. Imperialistic,

After being lost in space for 500 years, Buck and his spacecraft are recovered by citizens of the far-flung 25th Century.

Edwardian England. You could put a plume on that helmet and ride in the horse guard at Buckingham Palace. The soldiers all have high stiff collars that make them look proud and elegant — and repressed.

"The women's dresses have leg-of-mutton sleeves, a little like a Gibson Girl — though that was from a somewhat later period. I saw those in a book and had them made in all different colors. We added lots of ribbons."

To better entrench the idea of a throwback to an age even more puritan-

ical-looking than 1978, other elements were contributed. "The city is domed and super-modern, but it has flying buttresses. In amongst the settings are a preserved willow tree, a fountain, a Chippendale chair, an antique lamp on a futuristic desk, a cathedral — creating a modern city with echoes of what has happened in the past."

The most significant echo, plot-wise, is Chicago — what is left of it. In the 25th Century of the story, Chicago is a "Lost City," a collapsed mountain of ruins, into which Buck escapes and where he finds the graves of his parents.

"We take it for granted — though this is not an explicit part of the story — that aside from the single domed city, the evolution of the rest of Earth has been disastrous. We just filmed the Chicago scenes the other day. We used the burned-out back lot of MGM, at night. It looks like Berlin after the war — all rubble, with strange creatures sort of covered with leprosy. There is a definite feeling of a swampy deterioration of things outside the doomed city."

For Stevens, the quintessential 25th-Century setting is a ballroom — where Buck shakes up, and loosens up, the Edwardians.

"We wanted a lot of beauty, almost a *Wizard of Oz* quality, like an enormous Tiffany lamp. All around the sides there's a huge rainbow scroll painted on. This is an inexpensive set, but when it's lit from the back, it becomes a jewel. It's just gorgeous."

The rainbow motif integrates the ballroom with many other settings and design elements. "It's in everything — red, orange, yellow, green, blue and violet. It's on their armbands, in the medallions, on the ships." And the jewel image occurs elsewhere as well. "In our model of the domed city, which was based on Saint Michael's Mount (a lushly verdant, lofty island in the English Channel, surmounted by a 12th-Century monastery), we suggested the rainbow motif by sticking tiny crystals of different colors into the structures. When you light it, it glints and shows off refractions like diamonds."

But this is the 25th Century, after all, and there's ample imaginative technology to suggest it. In the ballroom, for instance, "you first hear what appears to be a huge orchestra and there discover this one guy going crazy on 20 keyboards. He hits one chord and you hear 30 violins. And when Buck takes over, two or three little notes make a whole rock group."

To achieve the technology of an Earth engaged in intergalactic space warfare with evil Draconians, Stevens and other writers and designers started with sheer guesswork — extrapolating from the machinery of today and projecting it to wild extremes.

"Working with the guys out at the Venice plant (Future General), where the effects are to be photographed, we started with the simple notion that the spaceships had to look futuristic, had to be what we



PHOTO: © 1978 NBC

Gil Gerard and Erin Gray as Buck Rogers and Col. Wilma Deering. Producer Larson describes Buck's 25th-Century world as "spacey Edwardian. The soldiers ... look proud and elegant — and repressed."

call 'high tech.' "

The high tech approach has already given us everything from the ships of *2001* to the more fanciful fleets of *Star Wars*. Begin with images of NASA and Russian hardware — the Apollo-Soyuz docking, a LEM, a Saturn V — and mold these forms to fit the functions of imaginary fighters and starships. But the *Buck Rogers* crews did not stop with high tech. Story considerations and other fantasies tempered the shapes.

"We see the Draconians as sort of a Mongolian horde. They come down in an enormous spacecraft carrier that has an evil, hooded look to it. And when you see it up close, it's dotted with little yurts (Siberian huts) and minarets" — primitive architectural shapes that the Draconian mentality would be comfortable with. "The Draconian fighters have a sort of Ku Klux Klan hooded look to them."

Carrying through with the Mongolian idea, "the invaders are tattooed all over their faces, with one eye made of a ball bearing which glints in the dark. They wear teeth and claws around their necks. We found a dragon used on a Japanese warship in World War II, and used it as their helmet. Now you put those guys in a spaceship like that, give them that helmet and red goggles — and they look like Hell's Angels coming at you."

Stevens finds the Mongolian culture as beautiful in its way as the Edwardian culture. "It all comes out as stylistic elegance," he says.

In contrast to the wart-covered,

plumbing-coated bad guys' ships, the Earth ships are sleek, shiny and efficient-looking.

Showing sketches of the ships (not available yet for publication), Stevens laughs and adds, "There are huge models of these things. In fact, Universal should send the *Galactica* and *Buck Rogers* fleets to the next Rose Bowl parade. No explanation — just show them. I tell you, we could really freak out the Soviet Union; their whole spy apparatus would fall apart! The ships are rendered in such detail — and really look real."

For *Buck Rogers*, then, the 25th Century is extracted primarily from the story — from its action and characters — and from the general ideas of "high tech" available to those versed in today's science and technology. Once the basic principles of story and design were established, Stevens explains, minor problems "are just solved as we go along."

Some of these minor concerns: "There's a set — a throwaway set, really, that you see for only a short time — which is so tasty and different. It's all white with a solid neon red stripe around it; so simple and yet so striking." This and other settings were designed by Paul Peters. "He's a really super, super designer."

Against that simplicity, consider Princess Ardala's quarters on her Draconian mothership. "She's got this big lovely bed, with four, blue neon posts, and steps leading down from it to a swimming pool. That's really a shocker in a spaceship! All that opulence."

There's a robot, Twiki, who carries around a sentient robot, Feo, attached to its neck, who talks, blinks its eyes and changes colors according to mood. Finding an actor to do the voice was a problem — until someone had a brainstorm. "I think this can be revealed now. The guy who spoke for Hal, in *2001*, will be Feo's voice. So we'll have that sort of patronizing personality — and we'll simultaneously tip our hats to *2001*."

On the Draconian ship, "there's a design element that runs through every single set — a groove, a channel in the wall in which there is cabling that's colored red, purple, orange and green — all numbered and technical looking. Everywhere you go you see this one heavy, naked technical thing, the spine of the ship, out of the corner of your eye."

Peters startled the production staff "by painting the interior of the Draconian ship rust-colored — not the battleship gray you expect it to be. Somehow it implies weather and rust and decadence," while creating a very colorful environment.

Some design elements defy common-sense projections for the future. "Probably, some day soon food will be miniaturized — especially for space travel. With your little emergency kit, you won't have to worry about nutrition for the rest of your life. Well, we can't do that, because dramatically we have to stop for meals so people can talk. And we have to have them stopping to get food, and so on. Let's call that one of the humanizing aspects of TV space shows — made for the part of the audience not sympathetic to space fiction. We make these concessions for Middle America — Oklahoma and Kansas — which just isn't all that interested in those things flying around and lighting up. But it turns out very well for us because it does lend a certain odd stability to the whole thing."

The problem of creating food for the future became the problem of simply creating odd stuff to eat. "We needed an alcoholic drink, so we invented Vinol — which can be ordered in any 'proof.' I've spent lots of time in the Universal commissary inventing foods with the chef there. We did weird things with orange peels, Kiwi fruit, canteloupes ... we attached a lobster claw to a chicken. Mainly, it all just had to look *different*."

All of the issues discussed here were faced and solved for the first of the three, two-hour *Buck Rogers* pilots ordered by NBC — which is to air, "Oh, sometime between November and the end of January this season," according to an NBC representative. At the time of this interview, *BR-I* was almost "in the can," *BR-II* was being storyboarded and *BR-III* was just being written. While *II* and *III* will present new problems, the basic 25th Century devised for the first pilot will be reused. "All those millions of dollars spent initially have to be made to pay off in the long run."

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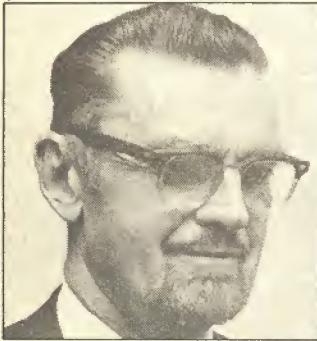
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future forum

Future Forum is designed to expose our readers to the thoughts of a variety of experts in the fields of science fact and science fiction. Each issue will pose a new question to our "guest panel" on a particular aspect of SF, space-age technology or future trends.

If you had a budget of \$10 billion to develop any futuristic project . . . what project would you choose?



L. SPRAGUE DE CAMP

Editor and author of *Lost Continents* and *Lest Darkness Fall*.

I would put it into archeology research and saving the whales. Otherwise I'd use some for longevity research.



BJO TRIMBLE

SF artist, fan, writer and editor.

I suspect I'd put most, if not all of it, into medical research. There is no reason why we could not put every great medical mind in one place and get them to work at eradicating all kinds of horrible diseases which have no good reason for existing any longer on this planet. The money could go into developing a space station research center where things could be studied without the hassle of gravity. Take a quick walk through your local school for the handicapped sometime and think of what else you'd spend that money on!



CHARLES H. SCHNEER

Producer of *Mysterious Island*, *First Men in the Moon*, *Jason and the Argonauts*, *The Seventh Voyage of Sinbad* and *The Three Worlds of Gulliver*.

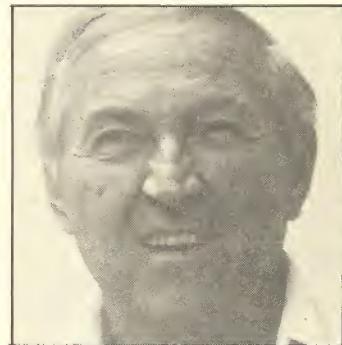
With a budget of \$10 billion (or is that a typographical error) one could develop anything, perhaps even a movie about a studio head who offered such a budget. But it would have to be a comedy.



GAHAN WILSON

World-renowned cartoonist for *Playboy*, *The New Yorker*, *Punch*, *National Lampoon* and the *Magazine of Fantasy and Science Fiction*; designer for Phil Kimelman Animation and author of *And Then We'll Get Him* and *I Paint What I See*.

I would pour it into searching out realistic methods of protecting the ecology.



GEORGE PAL

Producer of *The War of the Worlds*, *The Time Machine*, *When Worlds Collide*, *Destination Moon* and *Doc Savage: Man of Bronze*.

If I had a budget of that size I would most certainly put it into solar energy, space exploration and, with the money left over, into some good SF pictures.



JOANNA RUSSELL

Author of *Picnic on Paradise*, *Chaos Died*, *The Female Man*, *We Who Are About To* and *The Two of Them*.

In middle age one stops being quite so fascinated with toys and hence not quite so technophile. I would do what I could to eliminate hierarchy from human life — a tall order but one on which I believe everybody's happiness depends. By hierarchy I mean sexism, racism, class, every form it takes. And I would begin by buying out *FUTURE* and taking a good hard look at its editorial page: Norman, Kerry, Howard, Ed, David, Richard, Ira, Bob, David and Tom. Not to mention Ron and Jesco. Half your production staff and two thirds of your art department are female, period. This is not only unfair but stupid — you are limiting your outlook on the world, which is the last thing SF should do. Go read Asimov's article in your own first issue.



MARION ZIMMER BRADLEY

Author of *The Heritage of Hastur*, *The Shattered Chain*, *The Sword of Aldones*, *Darkover Landfall*, *The Planet Savers*, *Stormqueen* and *The Spell Sword*.

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LARRY NIVEN

Author of *A Gift From Earth*, *Neutron Star*, *Ringworld*, *The Flight of the Horse*, *The Long Arm of Gil Hamilton* and *The Protector*.

I would put an industrial base on the Moon. By the time the ten billion was gone we'd be making money.



DR. MARK R. CHARTRAND

Chairman, Hayden Planetarium.

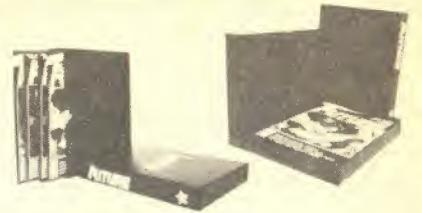
All my futuristic ideas will cost more than a few gigabucks. But for this amount I would pursue large-scale computer modeling of weather and climate. It may be that the scale of the problem is too large even for this sum, but at least we could be much further ahead than we are now in a field that is about as vital as you can get.



POUL ANDERSON

Hugo and Nebula award-winning author of *Tau Zero*, *Operation Chaos*, *A Midsummer's Tempest* and *The Earth Book of Stormgate*.

I would definitely be aimed at getting a permanent foothold in space. Just what form this would take, nobody can quite say yet, so I'd begin by funding some large-scale, realistic studies. Obviously no foothold can be permanent unless it is profitable, so in effect, I'd like to put up a permanent Skylab or two, supplied by space shuttles, devoted partly to basic science but partly also to industrial research. If it turns out that, say, ball bearings and certain pharmaceuticals are best produced in free fall . . . you can leave the rest up to the manufacturers. F



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CLONE MASTER

Edited by ED NAHA

Anyone who has been watching television for the past eight weeks or so can testify that the current television season is almost as confusing as last fall's onslaught of shows. Starting off with an ill-timed bang, the 1978-79 brigade stumbled to a start amidst a countless number of specials, telefilms and TV pilots aired during a two-week blitz in early September. As bedazzled viewers attempted to sort their way through the return of *Roots* and the hourly *Big Event*, network programmers took note of the strongest new entries and made plans for potential

series-to-come.

One of the biggest winners of the new season seems to be NBC's *The Clone Master*, which looks like a good bet to become a series later this season. Starring Art Hindle as Simon Shane, the impressive telefilm recounted the tale of a scientist's efforts to clone thirteen copies of himself. The proposed series would trace the adventures of one clone each episode.

The heads of NBC-TV seem to feel that *The Clone Master* concept would be a very topical arrival in terms of today's current test-tube-oriented events. The show's writer, John D.F. Black, is quick to point out, however, that Shane is not a creation-come-lately. "The show's producer, Mel Ferber, sold the title *The Clone Master* about two years ago," he says. "But it

wasn't until cloning got big this year that he was given the go-ahead. I was brought in to develop the idea. What nobody really knows is that the series had its beginnings over thirteen years ago when Mr. Ferber was producing *The 21st Century*, a news documentary show hosted by Walter Cronkite. The show went out to the University of Michigan to report on the first real cloning experiment. Mr. Ferber got an idea about a potential fictional portrayal and now, over a decade later, we're hot!"

John Black, a veteran of *The Man from Atlantis* and *Star Trek*, has great faith in *The Clone Master* as a potential hit series. As of this writing, so do the folks at NBC.

Right: Art Hindle as Clonemaster Simon Shane with offspring (inset) assistant

TV AT A GLANCE

Ken Johnson (the executive producer of *The Incredible Hulk*) is putting together a creepy telefilm entitled *The Plants are Watching*, an SF thriller about a species of super-intelligent plants who decide that they're mad as hell and not going to take it anymore . . . In case *The Swarm* didn't cause enough of a buzz

on the killer-bee front, CBS is readying a sequel TV film to their own *Savage Bees*. This time out it's *The Return of the Savage Bees* . . . The same network is readying an "all new" *Star Wars* TV special for the Thanksgiving holiday which will include some animated footage . . . Phil DeGuere, the writer-producer-director of TV's *Dr. Strange*, has just finished the first draft of his proposed Universal

telefilm based on Arthur C. Clarke's *Childhood's End*. The movie, if given the green light, would be one of the most ambitious science-fiction projects ever proposed for television. *Childhood's End* was originally slated to appear on the tube as an animated special produced in Australia . . . budgeting problems and contract difficulties caused that endeavor to be abandoned only a few months back.



THE MARTIAN CHRONICLES

Work has finally begun on NBC's mini-series, *The Martian Chronicles*, a show based on elements of the story by Ray Bradbury. The three-

part, two-hour *Chronicles* was adapted by Richard (*The Incredible Shrinking Man*) Matheson and is being directed by Michael (*Logan's Run*) Anderson, who makes his TV debut with the production. The mini-series was slated to roll earlier this year but

Left: Ray Bradbury (inset) tackles TV. Far left: Burton Cooper in the L.A. stage version of *Chronicles*. Near left: another face of Cooper in the same production along with Barbara Beckley.

ran into budgeting problems. The current effort is being produced jointly by Charles Fries and Dick Berg (via their separate production companies) with additional financing being provided by the British Broadcasting Corporation and the German TV company, Polytel. The big-budget *Chronicles* (costing in excess of \$7 million) will be filmed in England, with special effects being provided by John (*Star Wars*) Stears and camera work by Ted (*A Man for All Seasons*) Moore.

Rock Hudson will star as Captain Wilder, a character taken directly out of the book but amplified for the series. "We actually expanded that role to be a kind of connecting link between episodes," producer Fries commented recently. "He will narrate and take the viewer from one sequence to another." No airing date has been set as yet by NBC.



THE SHAPE OF THINGS TO COME:

While network programmers are busily forming plans for the upcoming "Second Season's" replacements and specials, Canada's CTV network is readying what may be one of the most ambitious, and riskiest, syndicated science-fiction TV shows ever to reach the States. A few months back, CTV announced plans to film *The Shape Of Things To Come* as a weekly, half-hour, \$200,000-per-episode series. Although the title is derived from the classic H.G. Wells work (made into a film by Alexander Korda in the 30's), the plotline will be totally original.

The show will present a less-than-rose-colored view of the not too distant future wherein, after an all-out world war, the citizens of planet Earth are reduced to a barbaric state. Civilization is kept afloat in a highly sophisticated Moon colony whose residents, while well-meaning, are somewhat priggish. Conflict between the two tribes of humankind will be the basis of the show. Starring in the adventure are

PHOTO: © UNITED ARTISTS



Nicholas Cambell as a Moon resident and Koo Stark as a woman of the future. The two, twenty-one-year-old actors will be joined by a robot called Sparks (created by *Star Wars*' John Stears) and a master-computer, Lomax, in their search for a

In the original *Things To Come*, Raymond Massey starred in a script penned by Wells himself. The new version will be a drastic TV update.

perfect society.

Helming the activity is veteran Canadian producer Bill Davidson who, with creative consultant Sylvia (*Space: 1999*) Anderson, will make sure the *Shape of Things to Come* runs smoothly. □

Spaceship San Diego

Visiting the Reuben H. Fleet Space Theater & Science Center

By DAVID HOUSTON

Most visitors to southern California know about Disneyland, the Universal Studios movie tour and the like; and readers of this magazine can likely add Mount Palomar Observatory, NASA's Jet Propulsion Laboratory and the Vandenberg shuttle launch site. But there's one attraction for the science-minded that does not have the national reputation it deserves. It's the Reuben H. Fleet Space Theater and Science Center in Balboa Park, San Diego, California.

The center offers a fixed exhibit which includes a large cloud chamber for spying atomic particles, tests for mechanical advantage, studies in light and color and optical illusion; it offers (irregularly) lectures and classes in astronomy and the physical sciences; and the lobby gift shop must be counted a main attraction: it is a veritable supermarket of science and science-fiction items.

The attraction which makes the Fleet Center unforgettable, however, is the multi-media presentation shown on the 76-foot hemisphere dome—the largest screen of its kind in the world—which culminates in about 25 minutes of motion picture shot in super-clear Omnimax and projected over the dome, with eight-track stereo booming from 152 speakers behind the overwhelming picture.

The center's director is Jack S. Laney—retired U.S. Navy pilot, holder of masters degrees in both aeronautical engineering and psychological counseling, administrator and teacher, avid space sciences enthusiast. He talks about the big show on the dome:

"Our Omnimax shows come from several different sources. First, we can actually contract for a film ourselves, and we have done so with three different films." One such was *Voyage to the Outer Planets*, which employed models and spaceships extensively. "We contracted that work out to Graphic Films of Hollywood. They do a lot of work for

PHOTO: DAVID HOUSTON



Above: museum and planetarium shops are veritable treasure troves for today's space-minded youth — the Fleet Space Theater shop is no exception. Right: an audience at the Fleet Space Theater is taken on a voyage to the outer planets on the domed Omnimax projection system.

NASA, but using our large-film-format Omnimax presented special problems for them. They were completely successful, though, and gave us special effects as good as any around.

"We've also contracted Imax Entertainment, Ltd., of Toronto, to make films for us. They did our *Ocean* feature. That's an expensive way for us to go, however. It costs a minimum of \$14,000 per minute of film. For any 25-minute feature (which is a normal length for Omnimax) a film is going to cost between \$250,000 and \$400,000, depending upon the shoot-to-print ratio." A ratio of one foot used to every five shot is considered unusually good. "Jacques Cousteau, on his underwater stuff, will do about fifty to one!"

PHOTO: COURTESY FLEET SPACE THEATER







The Navy's famous flying team, The Blue Angels, is one of the attractions of *To Fly*. The film was made for showing at the Smithsonian's Air and Space Museum in Washington, D.C. on a screen 50 feet high and 75 feet wide. *To Fly* was shot with extreme wide-angle lenses, however, so it can be shown on the dome of the Fleet Space Theater. The theater has been dubbed Spaceship San Diego as an expression of the degree of audience involvement possible with the exciting 70 mm, 15 perforation format. Each frame is roughly three times the size of a normal 70 mm frame.

"Our yearly budget is just over a million dollars, so we can afford only one production a year. Yet we need two. So we have to have other sources. Imax and Omnimax use the same cameras and projectors—which deal with a 15-perforation, 70-millimeter frame." That's a picture roughly three times the size of conventional 70 millimeter; it is created by feeding film sideways through the camera and relegating the sound tracks to separate 35 millimeter tape. "Imax is projected onto a flat screen, while Omnimax utilizes a fisheye lens for projection onto our dome."

"We now have an adaptive lens that allows us to project the film shot for Imax onto the dome with no distortion. This means that I now have access to the whole Imax library. I can lease an Imax feature for about \$18,000, and that's a far cry from the \$250,000 cost of an original production."

"There's yet another source available—a lease from a private company. Our current attraction is *To Fly*, which was made by Francis Thompson for Conoco at a cost of around \$750,000. That film was made for showing at the Smithsonian's Air and

Space Museum, in Washington, D.C., for projection onto their five-story, flat Imax screen. But it so happens that *To Fly* was shot with such wide angle lenses that I can show it here as Omnimax, without the adaptive lens. It covers the whole dome.

"A new film is being made by Johnson's Wax for the Aerospace Museum, which will be available for leasing in the spring of 1979. I'll be able to show that in Omnimax, too."

"One area that's theoretically available is for us to go out and get a sponsor to do a film for us. We haven't been able to pull that one off yet, but we do have two irons in the fire. One is for a show called *Tomorrow in Space* that might be made by an aerospace firm. There's a good possibility that we'll be able to get the Omnimax camera on the first orbital flight of the space shuttle. If that happens, it's going to be one terrific operation!"

The non-Omnimax portion of the show in the Space Theater uses all the tricks available to any planetarium director—and then some. The planetarium shows are organized around a theme, such as extraterrestrial life, written as tightly as

any documentary and narrated by accomplished actors.

In addition to the usual star and planet projectors, the Fleet Center has more than 80 conventional projectors at its disposal—to image slides of all shapes and sizes and motion picture footage from 16 to 70 millimeter. In addition to the 152 speakers behind the dome, there are 56 individually controlled speakers under the seats. (The auditorium accommodates 350 customers per showing.)

The planetarium show playing with *To Fly*, through the summer of '78, is *Skyfire*, which was produced by the Space Theater staff under the direction of Joseph Herrington, from a script by Rue Dolan, narrated by actor Vic Perrin. *Skyfire* breathtakingly explores the visual phenomena of the sky, including lightning, rainbows, St. Elmo's Fire and the aurora borealis.

Local advertising has called the Fleet Center "Spaceship San Diego"—expressing civic pride and touting the exciting experience visitors to their area have in store. The metaphor may be a bit stretched, but in this case it's perfectly honest advertising. □

Tomorrow

(Continued from page 77)

Second, a German group, OTRAG, is developing a series of commercial launch vehicles and a launch facility. It is not yet clear how viable that idea is, but private industry has been willing to invest many millions of dollars in it. Third, the idea of an Earthport in an equatorial free trade zone is steadily gaining interest in the international community.

Many people who were active in the early days of the U.S. space program bemoan these changes, particularly the lack of apparent interest on the part of the public in space affairs. They pine for the old days ... of space spectacles and almost unlimited research budgets.

Personally, I think the change is a healthy one. Space development had to move beyond the gee-whiz stage before it could amount to anything really important. If the public yawns at Apollo-Soyuz, and sleeps through the shuttle launches while flocking to see *Star Wars* for the fifth time, that's fine. It means that we are past the stage where a successful launch is a surprise, or a rendezvous and docking a newsworthy event. The prologue is over and we are ready for the real, routine work of space utilization.

The cliff-hanger lunar landings had to pass before industrialization could begin. It is not enough that space be accessible to a few perfect physical specimens. It must be open to the rest of us, to people like me with one good eye and a tendency to dizziness in high-speed elevators. The space shuttle is a big step in the right direction.

* * *

There is one final point that must be made. I have presented space as a place of unlimited potential, with abundant energy and raw materials. Is that potential real? Isn't space a collection of bleak, useless rocks, surrounded by vast regions of hard vacuum? Does it really have value to the human race?

I think it does, but it's not easy to give a proof of that. The most convincing argument I know is provided by the following speech:

"We all know that it has more than three times as many mountains, inaccessible and rocky hills, and sandy wastes, as are possessed by any State of the Union. But how much is there of useful land? How much that may be made to contribute to the support of man and of society? These ought to be the questions ... the agricultural products of the whole surface ... never will be equal to one half part of those of the state of Illinois; no, nor yet a fourth, or perhaps a tenth part."

Is this Senator Proxmire, talking perhaps about the Moon, or the surface of Mars? It is not. It was said by one of his predecessors, Daniel Webster, addressing the U.S. Senate on the 27th of June, 1850.

He was talking about California. □

Space Probes

(Continued from page 38)

up" flight plan. The probe is to be launched in June 1985 and will intercept Halley's Comet in December 1985 as the famous comet passes near the ecliptic on its highly inclined, highly eccentric retrograde orbit. Rendezvous is out of the question, since the relative velocities of the probe and comet will be about 35 miles per second. However, a small sensor probe may be deployed from the mother ship for a plunge into the coma and perhaps the nucleus of the comet.

Using its ion drive system, which expels ionized liquid mercury via the power of a 25-kilowatt solar electric panel, the probe will then jockey its orbit to match that of the short-period comet Tempel II. Since Tempel II is a much "quieter" (burned out) comet, there will probably be little danger in approaching it closely. Sometime in 1988, the probe will match orbits and close in, perhaps to the point of a gentle "docking" with the remnants of the dusty snowball.

There is plenty of room in that modest launch schedule for more "fast" missions, voyages that take only a year or two. A more sophisticated Venus orbiter/mapper with imaging radar is one good candidate. Follow-on Mars landings continue to attract interest.

The proposed Martian rover is the most sophisticated robot explorer in the foreseeable future. Developed by the Jet Propulsion Laboratory for NASA, the intelligent machine could travel 100 miles across the red planet, functioning as a rolling 3-D photographer, surveyor and chemical lab for curious scientists back on Earth. Carrying more than 200 pounds of scientific instruments, stereo cameras and advanced computers, the Mars rover is capable of operating independently, without detailed instructions from Earth.

The Mars rover could land in 1984, say JPL scientists. But a Mars rover mission is not yet funded or approved.

Even more distant destinations beckon Earth scientists. A 1977 study proposed landing a Viking-type scientific package on the surface of Titan. This Earth-like moon of Saturn has a heavy atmosphere and scientists want to search there for possible life forms. The Titan lander's mother ship would orbit Saturn, essentially showing us two "planets" for the price of one.

Many more interplanetary missions tempt Earthbound scientists. It remains to be seen how many will be carried out. The 1980s will bring a higher level of space capabilities and concurrent advances in the hardware and software that make up our robotic space explorers. Sights are set on far goals. Our intelligent spacefaring machines can bring us closer to the solar system neighborhood—and continue to expand human senses far beyond the reach of Earth. □

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STARLOG FUTURE

Have Reserved A Come up with the best idea

We've put money down on a Getaway Special, a bargain-priced (at \$10,000) passage for an experimental package into space and back—aboard the space shuttle.

And we're giving it away—to the person (or people) who come(s) up with the most interesting proposal for what to do with it.

What pet theory, bright idea or burning question would you like to test in space? Here's your chance for a free ride on the space shuttle to the ideal laboratory for testing out ingenious ideas about what can be done in the unique environment of space.

Make an amazing breakthrough discovery—the patent's yours! We'll pay the bill for your experiment's trip into space.

The Getaway Special is NASA's way of demonstrating how the space shuttle, with its cost-cutting features, will make doing things in space an afford-

able reality for many more people. In the 1980s, shuttles will be blasting off on regular flights to orbit. On nearly every flight, one or more Getaway Specials will be stashed in the shuttle cargo bay—space available, roughly first come, first served.

FUTURE/STARLOG's Getaway Special could fly as early as 1982, maybe not until 1984 depending on how flight schedules shape up once the shuttle's in operation.

We want the experiment to be ready in 1982—to take advantage of the earliest possible flight opportunity.

Now—how are you going to take advantage of this once-in-a-lifetime opportunity for a free ride into space?

Turn on your imagination and think about how to take advantage of the unique environment of space to do something really out of this world, something that can't be done on Earth.

Some things about the GETAWAY SPECIAL:

It can weigh up to 200 pounds. It can have a volume of up to 5 cubic feet.

It must fit into a cylindrical container less than 20" in diameter, just over 28" long.

It must not fall apart when subjected to launch vibration or bumpy, high-speed landing.

It must be completely self-contained. That means:

It must have its own power supply (none available from the shuttle).

It must be automated, able to do whatever it will do with the help of 3 on-off signals from the shuttle crew.

It must have its own data-collection system, if it needs to collect data *in space*. (Some experiments might simply require inspection on return to Earth.)

It must be able to withstand temperature extremes from -50° to 200°, or

If it needs to maintain a constant temperature, it must have its own thermal control system. If it's alive (that is, any life form higher than molds, insects

and plants), it must be cared for according to National Science Foundation guidelines on experimental animals.

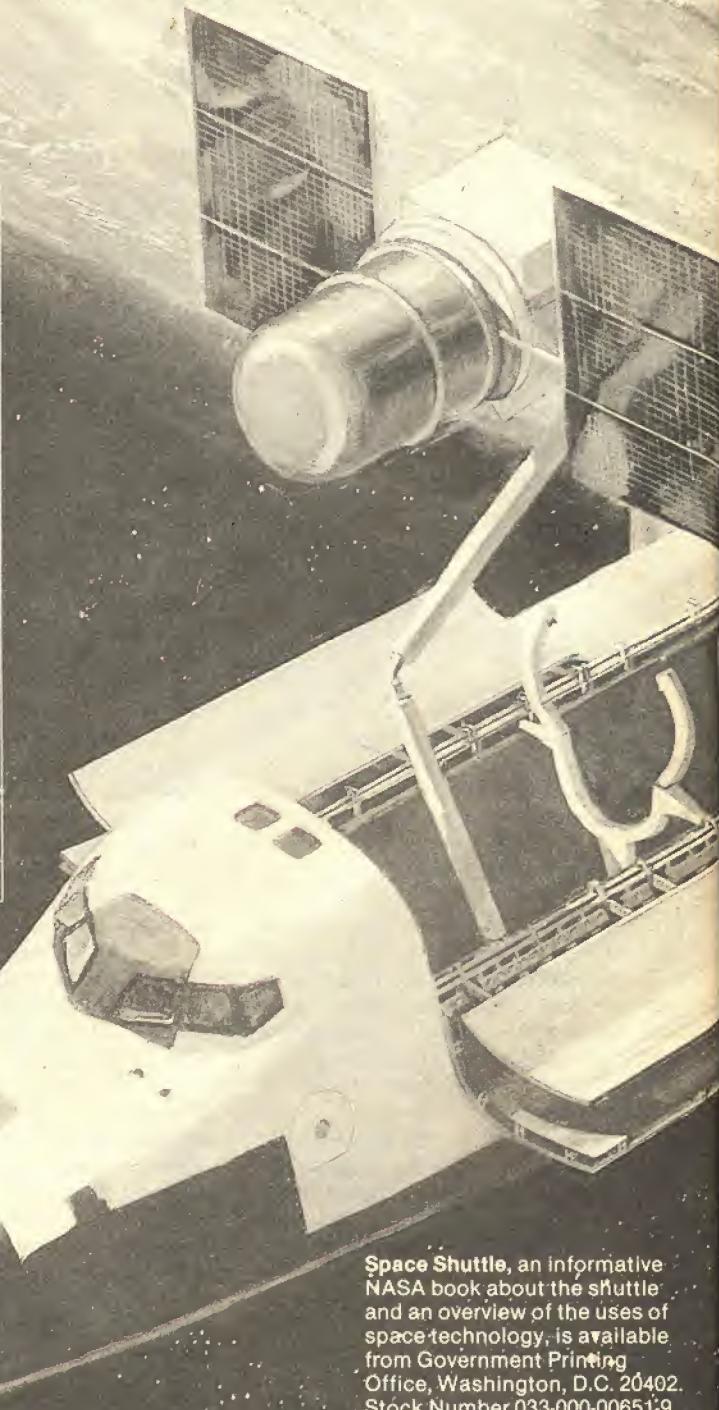
It may have a lid to open to space, or

It may have a vent to admit vacuum; or

It may be perfectly sealed.

It may be in space anywhere from 24 hours to one week.

It will stay in the shuttle cargo bay and be returned to Earth.



How to get started:

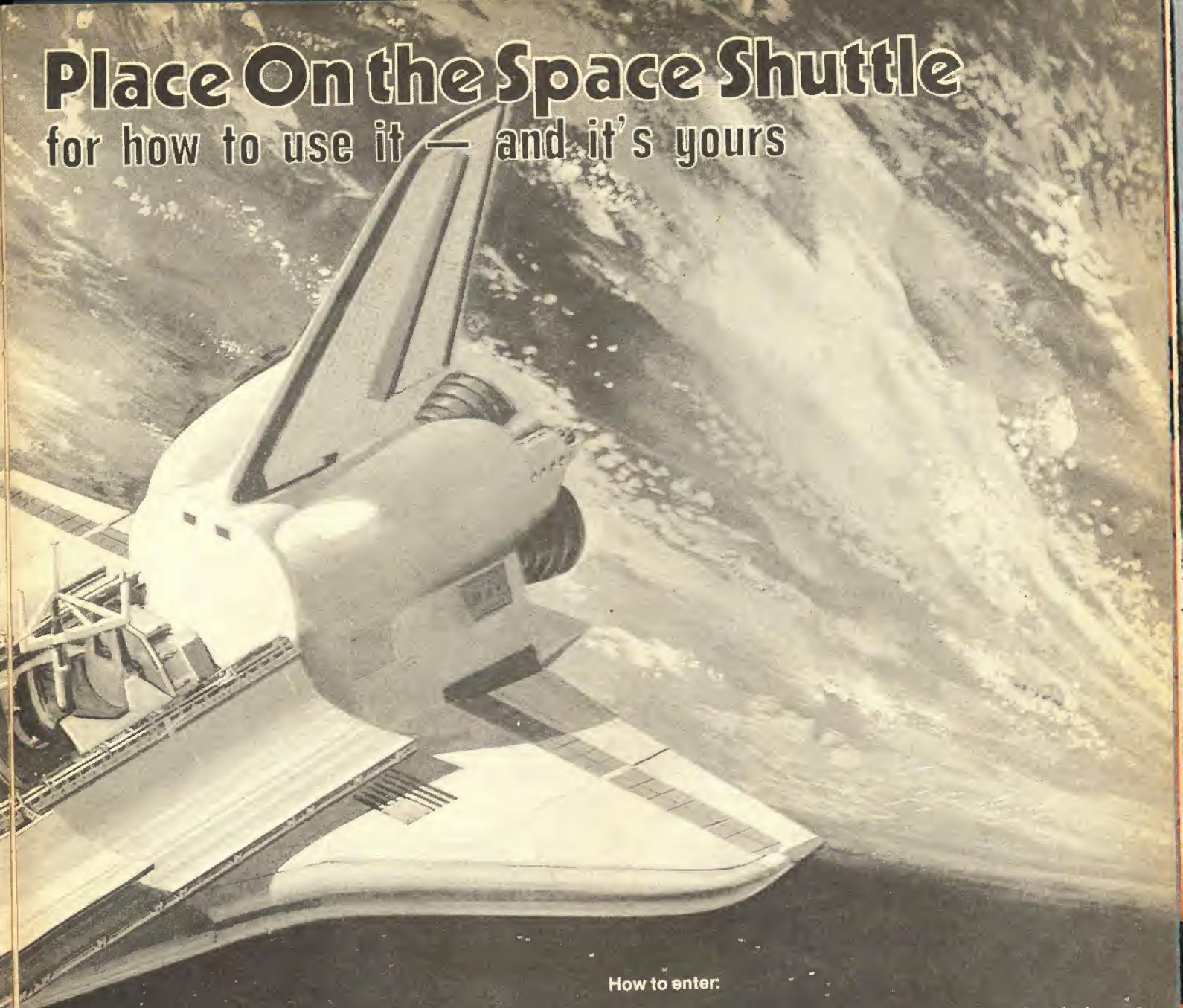
If the opportunity appeals to you, but you a) don't know much about the space shuttle, b) don't know much about what's been done with zero-gravity, vacuum and the space environment before, c) aren't immediately seized with the perfect idea or d) all of the above, here are a few places to look for general information:

Space Shuttle, an informative NASA book about the shuttle and an overview of the uses of space technology, is available from Government Printing Office, Washington, D.C. 20402. Stock Number 033-000-00651-9. Price, \$3.40.

NASA Office of Education, Dr. Fred Tuttle, NASA Headquarters, Washington, D.C. 20546. Ask for a list of NASA and Government publications about what's been learned in space.

Libraries, local scientific institutions, etc. Use your ingenuity, do a little research . . . see what you learn along the way.

Place On the Space Shuttle for how to use it — and it's yours



FUTURE/STARLOG's Getaway Special Advisors

G. Harry Stine, author of *The Third Industrial Revolution* and NASA consultant on space industrialization studies, is an expert on the space shuttle—and on the potential uses of the "natural resources" of space.

Leonard David, program director for the Forum for the Advancement of Students in Science and Technology, has fielded hundreds of requests for information on student experiments on the shuttle.

Jesco von Puttkamer, Senior Staff Scientist in Advanced Programs at NASA Headquarters and regular science

columnist in FUTURE, has been involved in space industrialization studies with NASA for years. His knowledge of space science is well-known to readers of "Science Notebook" in FUTURE.

In addition, several more advisors who are experts in various space-related fields will be selected to assist with final selection of FUTURE vs STARLOG Getaway Special Winner.

Who can enter:

Anybody: students, nuclear physicists, high-energy astronomers, biologists, metallurgists, photographers, artists, gardeners—whatever. You may enter as an individual or as a group. You may enter more than one idea (separate prospectus, please).

How to enter:

Send us a one-page typed prospectus on what you want to do with the Getaway Special. Make it a brief, clear statement of your experiment idea—what you hope to accomplish, test, demonstrate and/or find out in space, and how you plan to do it.

The prospectus must include the following information typed on the back side of the same page:

- 1) Your name (or if it is a group entry, the name of the group plus the name of one person who will serve as contact for the group).
- 2) Address (street, city, state, zip code).
- 3) Phone number.
- 4) Your age (or, for group entries, age range).

Mail your prospectus to:
FUTURE/STARLOG-Getaway Special
475 Park Avenue South
New York, N.Y. 10016

Entries must be postmarked no later than July 20, 1979, the tenth anniversary of the first Moon landing.

Prospectuses will be reviewed by FUTURE/STARLOG's panel of Getaway Special Advisors. Before a winner is chosen, a number of contestants may be asked to submit more detailed proposals for final judging.

Getaway Special winner will be announced in December, 1979.

FUTURE/STARLOG can assume no responsibility for material submitted. Keep copies for yourself. We can acknowledge receiving your prospectus only if you enclose a self-addressed, stamped postcard. No material will be returned. Prospectuses longer than the one-page limit will not be considered and will not be returned.

The Brothers Hildebrandt

"We're Gonna Outdo It All"

By BOB WOODS

The Brothers Hildebrandt are a unique artistic team combining to form an intense creative force. Watching them together is an experience. At one moment Greg is wildly displaying a concept from one of their paintings. Vividly describing a battle scene employing ray guns and warring Amazons, Greg's hands swoop to the noises that he adds for verbal illustration. Without warning, Tim cuts in and picks right up on his brother's lines as well as his gestures and enthusiasm. Greg goes silent.

Both have a very serious and professional sense of their work, but they get wide-eyed and sometimes frenzied when conveying ideas. All around them is a constant mixture of laughter, silence, motion, color, seriousness, energy and intensity.

Separately, their individual characters are evident, yet together they could pass as the first successful human clones. And no wonder the likenesses — they've been doing things together for most of their lives. Even from birth, very little has separated the two. In fact, in the past 40 years, not much more than five minutes has kept them apart — Greg is the older of the twin Hildebrandts.

Since their childhood days in Detroit, The Brothers have had a passion for science fiction and creating their images of it. "I grew up on comic books," says Tim, who comes off as more of the spokesman. "We were always drawing comic books."

Their fascination with the genre didn't stop there, though. After reading a comic book or seeing a movie such as *War of the Worlds*, they'd set about making costumes. "We made the green guys out of cardboard, cloth and masking tape," Tim says. "If I had to pinpoint the most exciting time in my life . . ."

Tim reminisces. "I remember when we were in high school, everyone else was going to junior proms and all that stuff. I never went to one in my life. All Greg and I were doing was building a planet set out in the barn. And a flying saucer — a nice, classic, smooth flying saucer. We put a silver dome on the top, and on the bottom we made a conical shape that came down."

With wonder in his eyes, Tim recalls how they proceeded to film (in slow-



PHOTO: © 1978 20TH CENTURY FOX

The 48-hour Star Wars poster. "One of us would sleep while the other painted."

motion, 8 mm) *War of the Worlds* ala Hildebrandt. With hair-thin wires, they suspended the saucer from a pole and then enlisted a 6'7" friend to "fly the thing over the set." Magnesium was used to stage explosions and fiery comets were created by throwing wads of gas-soaked paper at piles of magnesium.

Oddly enough, despite their impeccable reputation as illustrators (work influenced heavily by N. C. Wyeth), the Hildebrands aren't too comfortable with the title of artist. "Greg and I were never hung up on art or painting. We used to get bored to death." Their real desire was to make films. "It was movies, movies — it had to move!" In fact, since they first saw Pinocchio, their Nirvana was no farther than Disney Studios.

The Disney fever was the motivating factor that led them to a year of art school after high school. "We had written to Disney for eight years, getting mimeo letters back telling us to attend a basic art course." After art school, they wrote back, "Look, we took a basic art course. Hire us!"

For fine-tuning purposes they spent a couple of months taking illustration classes, where they found themselves

"drawing cars . . . In Detroit, what else is there to do? Airbrushed bumpers," Greg laughs.

The compulsion for making pictures move landed them a job at Jam Handy's, then nearly the biggest animation house in the Motor City. The job didn't prove to be terribly exciting. "Commercial stuff," Tim says. "TV ads, government film, historical semi-animation things." Like the job they did for the Campbell Soup Co. — "The History of Soup."

Yet there were assignments that were more rewarding than others. "We made a fireball one time . . . we helped to design sets and stop-motion jobs. It was a lousy TV commercial, but we were animating the puppets on the set, so we got a lot of experience."

After moving to New Jersey, The Brothers' next shift of gears found them making documentary films for the Catholic Church. Bishop Fulton Sheen had seen their work and enlisted their talents to produce PR for the Lord, sending them all over the world to shoot footage. One of the assignments called for a movie dealing with Vietnam. They added some of their personal opposition to the war, but their employers didn't share their views. Thus ended another chapter.

"I don't know how we got into making documentaries, but we did," Tim says. "Somewhere in the middle of it we said, 'All we are is a couple of newsreel photographers . . . everybody's doing this. What are we?'"

It didn't take much soul-searching for the brothers to decide "that we were artists," and the logical next step was to actively "get into it again."

"We put together our portfolio and went to a publisher," Tim recalls. The firm was Western Publishing Co. in New York, and the job was to illustrate children's books — including a couple of scratch 'n' sniff titles. "Giving all the kids cancer of the nose," Greg says with a mad, mock chuckle.

Not unlike their past duties, though, the world of kid-lit didn't go exactly as they would have liked it to. "It was some fantasy stuff to begin with," Tim says. "Then, all of a sudden it went into text books . . . really the bottom of the barrel in illustration." They were struck with the age-old question: "Oh my God, what did

"A Very, Very Close Encounter," (1973) by Greg Hildebrandt. "I was flipped out because of all the garbage illustrating we were doing. . . . I felt a lot better when this was done." Following spread: "The Siege of Minas Tirith." from the 1978 Rings calendar.



GREG
HILDEBRAND



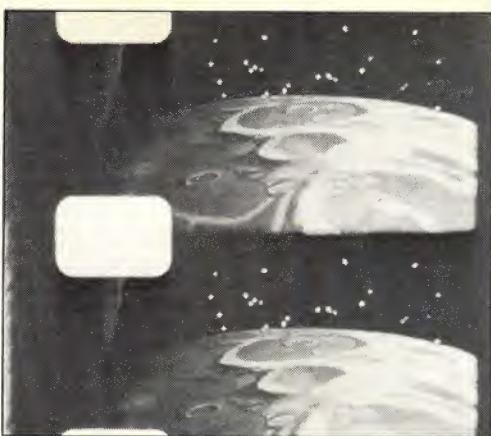
ART: COURTESY THE BROTHERS HILDEBRANDT



ART: COURTESY THE BROTHERS HILDEBRANDT



PHOTOS: COURTESY THE BROTHERS HILDEBRANDT



Far left and below: two SF book covers in the wake of the success of the *Rings* calendars. Left: two rare clips from *War of the Worlds* ala Hildebrandt, filmed while they were in high school. The top clip surveys their planet creation. The other clip shows the alien attack. Note the ingenious "death ray" coming from the saucer. This was cleverly mastered by simply scratching a pin across the film.



"When we were in high school, everyone else was going to junior proms and all that stuff. All Greg and I were doing was building a planet set out in the barn. And a nice, classic, smooth flying saucer."

we get ourselves into?"

Whatever it was, they didn't like it. "Right around that time," Tim says, "we read *The Lord of the Rings* and we said, 'We gotta illustrate it!'" It turned into one of those rare moments when everything seems to come together. "We had gotten ourselves off the track; years had gone by. *The Rings* was ... my God ... like this was it!"

It was 1974 and good fortune followed them, finding its way under Tim's Christmas tree. His wife, Rita, gave him a copy of the new *The Lord of the Rings* calendar, illustrated by Tim Kirk — the perfect gift, as it turned out. A few days later, Rita asked her husband if he had read the back of the calendar: "Any artist wanting to illustrate *The Lord of the Rings*, please contact Ballantine Books."

"The day after that we happened to be in New York with our portfolio. We went to see Ian Summers (at Ballantine)." But the manner in which they did typifies the combination of craziness and creativity that has come to be their trademark.

It was raining that day and they had to utilize some household means of keeping their paintings dry. When these two bearded guys from New Jersey came dripping into the posh, carpeted offices of Ballantine Books carrying large green garbage bags over their shoulders, no one was ready for the incredibly talented work that filled their makeshift portfolios.

Summers liked what he saw and gave them their first assignment — on speculation, of course. "As soon as we came back with that and showed it to them, we did the calendars." For the next three years, 1975-78, Ballantine's popular *Rings* calendars were lovingly illustrated by The Brothers Hildebrandt; the fourth turned out to be the biggest selling in calendar history.

The popularity and professional recognition of the Hildebrandts was now firmly established. Best of all, they were spending 18 hours a day immersed in the kinds of projects they had always hoped for. They felt the same kind of joy they had experienced back in their parents' garage in Detroit — building the models and drawing the comic books — realizing their childhood fantasies.

In addition to the calendars, Ballantine also commissioned The Brothers to do a series of science-fiction book covers, as did Ace and other publishers. And then came the *Star Wars* poster. George Lucas and company had commissioned several renderings of what he thought might be the "right" poster for his new adventure

movie. It was nine days prior to the film's premiere when The Brothers received a panic call from a New York agency. "We need a poster overnight, literally. Can you come and help us out? It's a fantasy film about space."

That was all they told them; they had no idea what *Star Wars* was all about. Nonetheless, it was largely their devotion to the field that found them rushing into New York. The studio gave them a pile of black-and-white photos for reference and one question: "Can you have it in two days?"

Tim relates the ensuing 48 hours. "We hustled ourselves back to New Jersey and immediately started drawing a layout. We got the layout drawn in a couple of hours, transferred it to a piece of masonite and started painting instantly. It was one of those deals where one of us would go to sleep while the other guy painted, then the other guy would take over, and we'd keep it going for 48 hours till it was done. We were under the impression that we were just doing a movie poster (though the poster never made it to the movies). About three days later we saw it on everybody's t-shirts and in every window in New York City."

The Hildebrandts have accomplished much in a short time, including respect and credibility in the burgeoning field of science-fiction/fantasy art. Many an artist would be satisfied with their present reputation, but it is not enough for The Brothers. They still have some longtime, personal dreams to chase after.

When the contract for the fourth Ballantine calendar came along, "We sat on it for a couple of months because we were in the middle of developing our own story," Tim says. The Brothers had already concluded that they wanted to do something original. Initially, they'd thought about doing a Hildebrandt calendar, but once they sat down to figure out the theme, they decided to expand the idea into book form — *Urshurak*. And their concept continued to expand, until they said, "The hell with (just) the story; let's come up with a movie." For the past year and a half, little has deterred them from the two projects.

"It was a crucial decision to make. We hadn't sold our story yet and there was the calendar waiting for us to do." Tim shrugs, "You gotta make a living."

Their doubts persisted. "We didn't want to make a career out of doing *The Rings*," Greg says. "We had covered it. By the third (calendar), we were bored with it. How many times can you do

somebody else's story. It was this whole thing of, 'Let's do our own story. It's got to be much more exciting to invent the whole thing.'"

Thereby ended the Hildebrandts' *Rings* calendars and began *Urshurak* — the book and the movie. They describe it as "a jump off the deep end," but the prevailing attitude was, "Man, *Let's do it*. We had a lot of conviction. We were gonna do it!"

But Ballantine didn't share The Brothers' enthusiasm for their pet project and hasn't called on them for any work since. "I think it has a lot to do with everybody feeling that *they* discovered you," Greg retorts. "They get into this whole trip that you are indebted to them; indentured slaves or something."

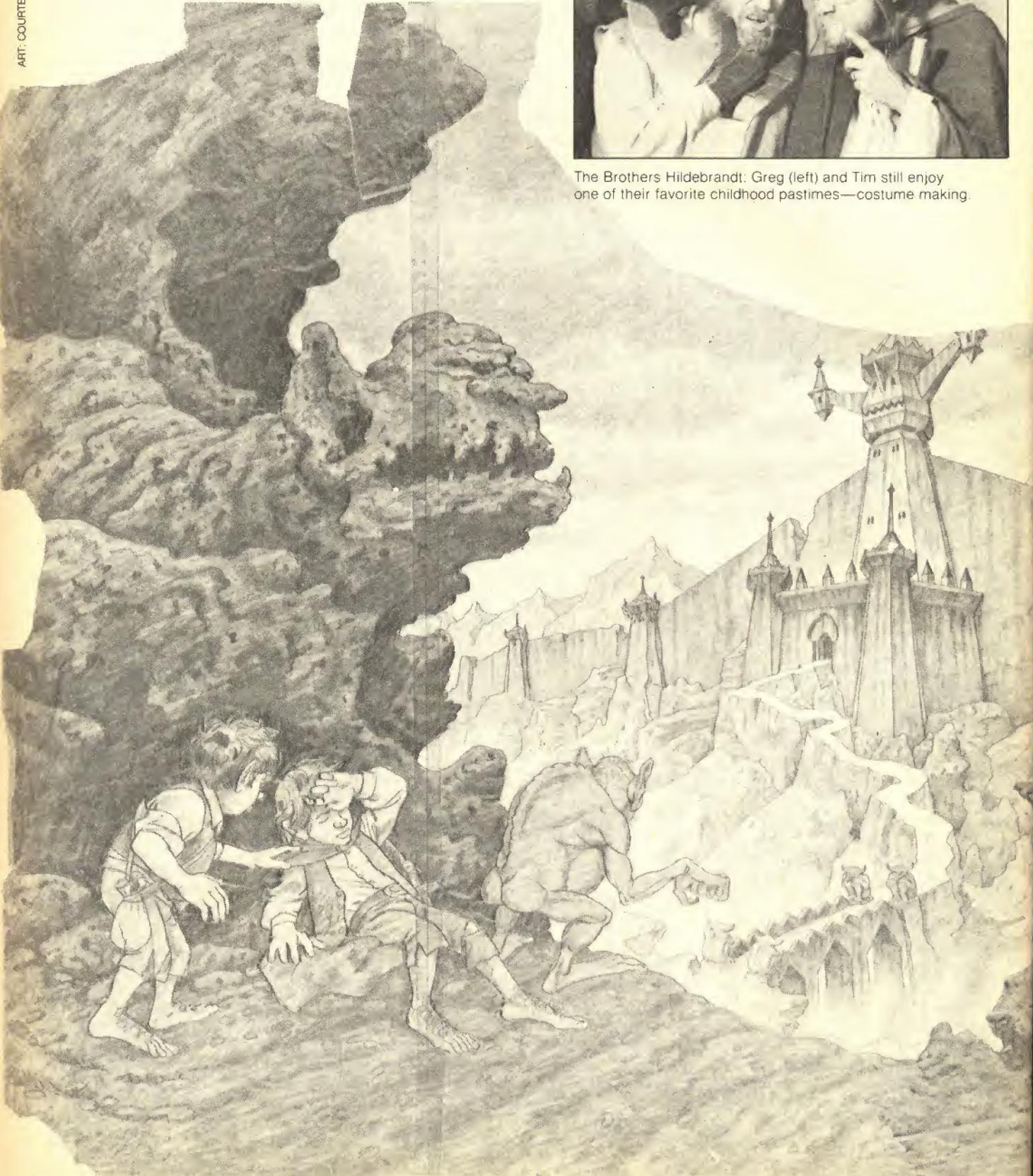
The *Star Wars* poster came and went. According to Tim, the famed painting is hanging in the 20th Century-Fox office of Alan Ladd, Jr. More recently, they spent four months putting together an unusual TV commercial introducing the 3M Corporation's new logo. The assignment turned into another opportunity to revert back to childhood funtime. Along with Gene Leroy, a retired modelmaker who had once worked for Disney, The Brothers designed a spectacular set to creatively illustrate, in three dimensions, 3M's "corporate image." ("SF Graphics" will report on this in FUTURE #9.)

Urshurak had rather humble beginnings. It took nearly a month of "walking in circles and taking notes" to pin down the storyline. Yet with only six pages of the draft completed, they rushed over to their musician friend Bill's house to see if he wanted to score the movie. Bill, who was busy knocking down a wall when they dropped by, recalls the incident. "They arrived ... with a half-cooked turkey, half a bottle of wine and six pages. 'Bill, you want to do some music for some big fancy movie?' 'Well, I'm knockin' down this wall right now . . .' " Greg adds, "Then *Urshurak* got going. Bye-bye everything else. It was really complete and total involvement."

What's *Urshurak* all about? As it goes in the world of advance publicity, little can be revealed at this time. The book is slated to be a major release from Bantam and is scheduled to be in the book stores by spring of next year.

Suffice it to say that *Urshurak* will be a Tolkien-esque fantasy novel complete with a Messianic elf prince, mystical wizards, an evil power and a rallying of the good guys against the bad guys. The book is being written by a longtime friend from Detroit, Jerry Nichols, and exquisitely illustrated

Below, far right: two preliminary sketches for *The Lord of the Rings* calendars. Until recently, The Brothers drew very detailed sketches, some which took several months to execute. When this proved to be too time-consuming, they began doing very basic preliminary work and concentrating more on the painting itself. Their painting style is to work from the background and paint forward.



The Brothers Hildebrandt: Greg (left) and Tim still enjoy one of their favorite childhood pastimes—costume making.

The Hildebrandts are now fully committed to "Urshurak," their original book and movie.

"Our movie is going to be a masterpiece!"



by Greg and Tim. The oversized paperback will include 18 full-page color plates in addition to numerous black-and-white drawings.

It would be too easy to link *Urshurak's* plotline with the Hildebrandts' close association to Tolkien's works, and the criticism is sure to arise from *Rings* purists. "We were into it long before *The Rings*," Tim says matter-of-factly. "We don't consider ourselves *Lord of the Rings* fans; we consider ourselves fantasy fans." However, they are quick to give Tolkien his due credit. "Tolkien had gotten it all together, though the only creation was the hobbit."

This led to the question of why the Hildebrandts agreed to illustrate Terry Brooks' *Sword of Shannara*, a fantasy epic that's come under fire for its obvious Tolkien similarities. "We were signed to a contract," Tim says simply. "I started to read it — I was saddled with it — and every 25 pages or so I'd say, 'Augh, come on!' I realized it was a rip-off and I said, 'OK, I'll read it on that level.' I'd say 75 percent of it (was a rip-off). It's obvious the guy was a fan — it went to his head. We were conscious of our similarities and we tried to stay away from it, but it couldn't be helped. I mean, what does a White Wizard look like?"

With the book project now completed, the brothers are busy working on *Urshurak's* look for the wide screen, although they're still not sure that Hollywood can capture the unique creations set forth in the novel. Citing the special effects wonders of recent films, Greg says "The moguls are becoming educated and the people want to see it. The special-effects people — like Trumball and Dykstra — have raised it to an art. People respect them and the moguls listen. Now the true stars are coming out; now they're becoming recognized."

But Tim says that the "look" they're after can't be compared to anything that's been done so far. "I want to see it because it's never been done. We're gonna outdo it

all . . . outdo them in an effects look!" So now the push is on to find the Hollywood people with all the machinery to pull it off. Greg laughs at the apparent paradox. "It's a nice balance . . . some of the most complex mechanical devices to tell a sort of anti-technical tale."

The discussion of technology carries Tim back to his first love. "I've never had anything against the science-fiction aspects of technology — rockets, flying saucers, space travel. We never looked at it as science fiction. I remember after seeing *Destination Moon*, we used to go around the family talking about weightlessness. Aunt Gurdie looked at us like we were nuts. 'You've been watching too many *Flash Gordon* movies.' "

Greg and Tim easily admit that even if they do find the right effects people, they might still run into stumbling blocks once they get to Hollywood. But they're adamant about striving for the look they have in mind. Says Tim: "Our movie is going to be a masterpiece. If it's not, I don't want anything to do with it. As long as everybody's together in holding their ground, we'll be able to maintain it. We've already made up our minds. If it gets down to, 'We'll get a guy to do this and a guy to do that and you guys are out,' we don't want a goddamn thing to do with it. We realize we're going to be dealing with many people — directors, script writers — and obviously there are going to be all kinds of concessions. We are aware of that. Nobody's going to give you \$20 million and say, 'Here, go make your movie.' "

Back at Greg's studio in New Jersey, The Brothers Hildebrandt are diligently toiling to whip the masterpiece into shape. For the time being, they consider themselves "out of illustration." As far as they're concerned, they've done that and now it's time to move on and fulfill a few more of those childhood fantasies. □

"The Brothers Hildebrandt: A Book About the Artists." has been published by John Taylor. For details, see page 18.

PART II

Operation Morning Star: The Unveiling of Venus

Last issue's investigation of space was aboard the Pioneer-Venus probes. Part I left us hovering over the Venusian landscape — a scorching, dull-red dust bowl. The historic journey continues . . .

Ves, peeking under the veils of Goddess Venus is a job of considerable magnitude and difficulty. The planet's clouds are no ordinary clouds. Fast-moving, pale-yellow in color, they surround the planet unbroken in a distinct 18-mile-thick layer at altitudes between 30 and 50 miles. Unlike the white clouds on Earth, they cannot consist of water droplets in an atmosphere made up of 97% carbon dioxide, some nitrogen and only traces of water vapor. The mystery remained unsolved until 1973, when Andrew T. Young of Texas A&M University found that the properties of concentrated sulfuric acid fitted in with the observed polarimetric characteristics. Today we know from data obtained by James B. Pollack and others in NASA-Ames' high-flying C-141 Kuiper Airborne Observatory that sulfuric acid comprises more than five-sixths, 84%, of the clouds. According to Young, there may also be some elemental sulfur. With that much acid, an effective drying agent, there must be even less water in suspension than previously assumed.

Yet, we understand little of the structure of these clouds. Seen in ultraviolet light, they show dark markings of characteristic form, and it is these marks that reveal the rapid motion of the clouds. Zipping across Venus' face at about 225 miles per hour, some fifty times faster than the planet's own slow rotation, they travel around Venus in four days. The high winds that push them play an important role in the weather on Venus: they are part of a huge atmospheric engine that shuttles energy from the planet's equator toward its poles.

Above the clouds, there are tenuous layers of haze. Below, the "air" is clear, but hot and thick. At "sea level," its pressure is ninety times higher than on Earth, and its density would make it very difficult to move around.

Penetrating such an inferno of an atmosphere for a soft landing on the invisible surface calls for a special strategy, executed first by the Russian Venera probes: a slow descent, on parachutes, through the

mysterious cloud layer, to gather scientific data, and a subsequent fast plunge, without chutes, through the bulk of the hot and dense atmosphere below, in order to protect the lander from overheating.

The last two USSR spacecraft, Venera 9 and Venera 10, each weighing over 700 lbs, touched down on October 22 and 25, 1975, respectively. Two days prior to their searing entry into planetary atmosphere, the automatic devices had separated from their "buses." These spacecraft became Venus orbiters, serving as communications relay stations between their landers and Earth. After impact, at a crushing 15 miles per

on the ground have been found to be very low — around one to two miles per hour — and, consequently, there is little dust in the Venus atmosphere. Thus, wind erosion does not seem to be involved here. Instead, the high temperatures may cause chemical interactions of the rocks and the atmosphere — corrosive reactions which would release substances into the "air" that on Earth would be bound in the rocks, such as chlorine and fluorine, resulting in hydrochloric and hydrofluoric acid. Such surface processes would explain the presence of the sulfuric acid clouds at 30 to 50 miles above the surface.

All in all, the results from past Mariner and Venera missions have increased our knowledge about the planet, but they have at the same time opened a tangle of new questions and deepened the mystery.

With Venus so much like Earth in mass, diameter, density and distance from the Sun, why has it developed so extremely differently from Earth? Why is its surface so much hotter, its atmosphere so much denser and its rotation so much slower than that of Earth?

Water exists on Earth so abundantly that more of its surface is covered by oceans than by dry land. Even Mars, as the Viking pictures have shown, had undoubtedly enough wetness in its long-ago past to carve out river meanders, stream beds, canyons and deltas. Were there oceans on Venus before the surface got too hot to retain liquid water? And if so, where did they go?

If they evaporated, the Venus atmosphere should be more than twice as massive as it is, carrying water vapor of 150 atm pressure in addition to its 100 atm of mostly carbon dioxide. And where is all the oxygen which would have been broken out of the water molecules by solar ultraviolet radiation? Did it enter into new chemical unions with surface rocks, or with sulfur to form the sulfuric acid droplets clouding the planet's hellish atmosphere?

Why does Venus, under its maidenly



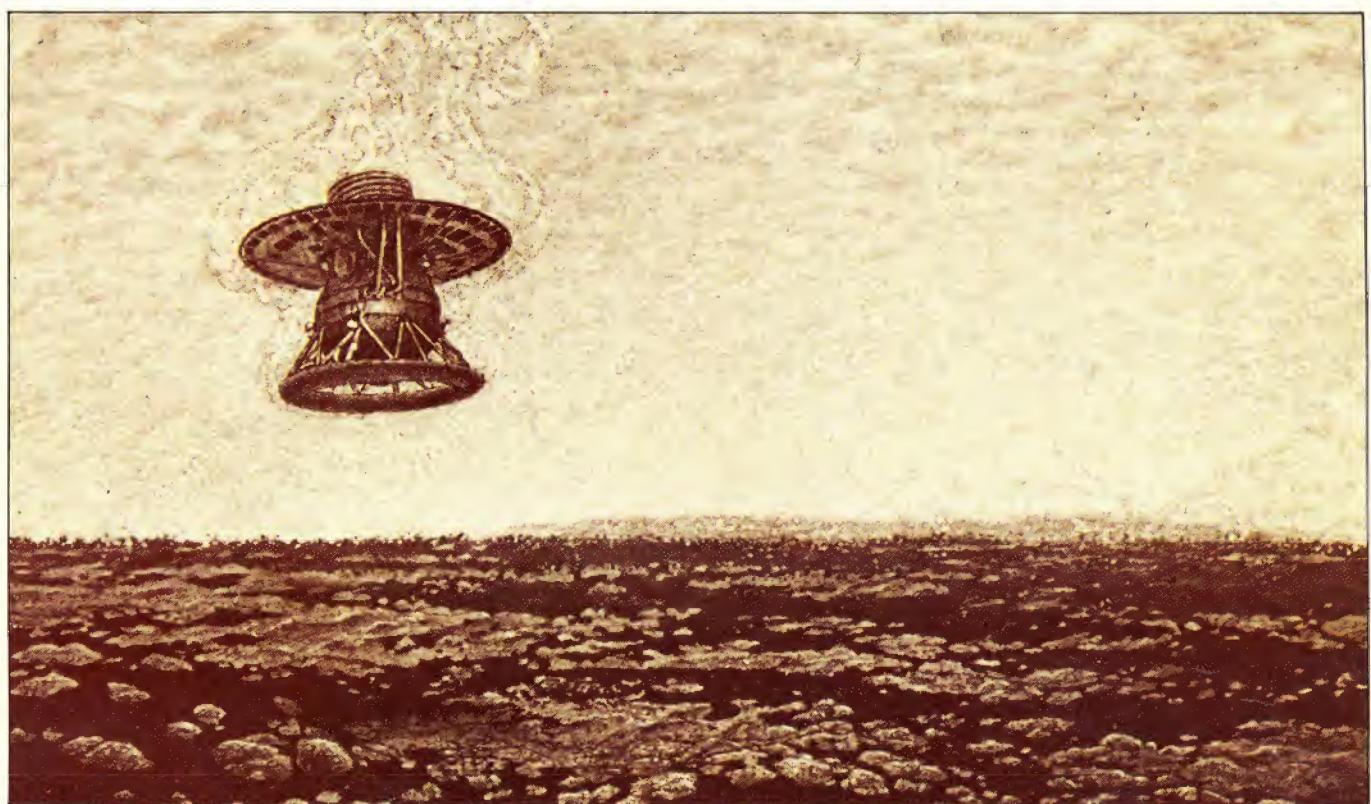
PHOTO: NASA

hour, both landers remained within radio view of their orbiters just long enough to transmit one panorama picture each across 40 million miles to Earth, plus scientific data of the Venusian environment.

The pictures, taken about 1250 miles apart, showed two very dissimilar regions of the planet's surface. Venera 9 had landed on a steep slope of a hill covered with stones, typically a foot or more in size, with rather sharp edges. Obviously, they have not yet been affected noticeably by surface erosion, indicating the geological age of the landing region to be relatively "young."

In odd contrast, the Venera 10 panorama showed a rather smooth plain or plateau with flat stony patches which appear to be exposed bedrock, but no stones. This suggests an age older than the other landing site, but it also poses the puzzle of how the layered rock had been exposed in the first place and how the edges of the visible outcrops had been sanded down over the ages. Liquid water cannot exist on the planet's hot surface. Wind velocities

Jesco von Puttkamer is Program manager of Space Industrialization and Integrated Long Range Planning Studies at NASA. He is also the technical advisor for Paramount's forthcoming Star Trek movie.



The Russian unmanned Venera 10 settles through the dense Venusian atmosphere (equal to 92 Earth atmospheres). A surface temperature of 465° C. was monitored with a slight breeze of 15 feet per second. No evidence of the "fishbowl" distortion was detected.

veils, rotate so majestically slowly — once every 243 Earth days (compared to Earth's once-per-day spin)? Curiously, a day on Venus is longer than a Venusian year (225 Earth days), and its solar day — from sunrise to sunrise — is about 117 Earth days, resulting in two sunrises and sunsets every rotational (sidereal) day. Next: why does it rotate in the "wrong" direction, retrograde, opposite to its annual revolution about the Sun and to the spin of the rest of the planets? Did a former satellite of Venus once crash into the planet, changing its rotational characteristics? This theory, postulated long ago, has still not been confirmed or refuted. And why does Venus always present the same face toward Earth at each closest approach, i.e., when it passes between Sun and Earth? Is there a gravitational linkage between the two planets — or is it only coincidence?

Why has Venus no magnetic field to speak of? Unlike Earth, its atmosphere thus has no protection from the bombardment of high-energy particles — protons and electrons — known as the Solar Wind.

Venus knows not spring, summer, autumn or winter. Seasonal effects, if any, are minimal because the planet's polar axis is almost perfectly perpendicular to its or-

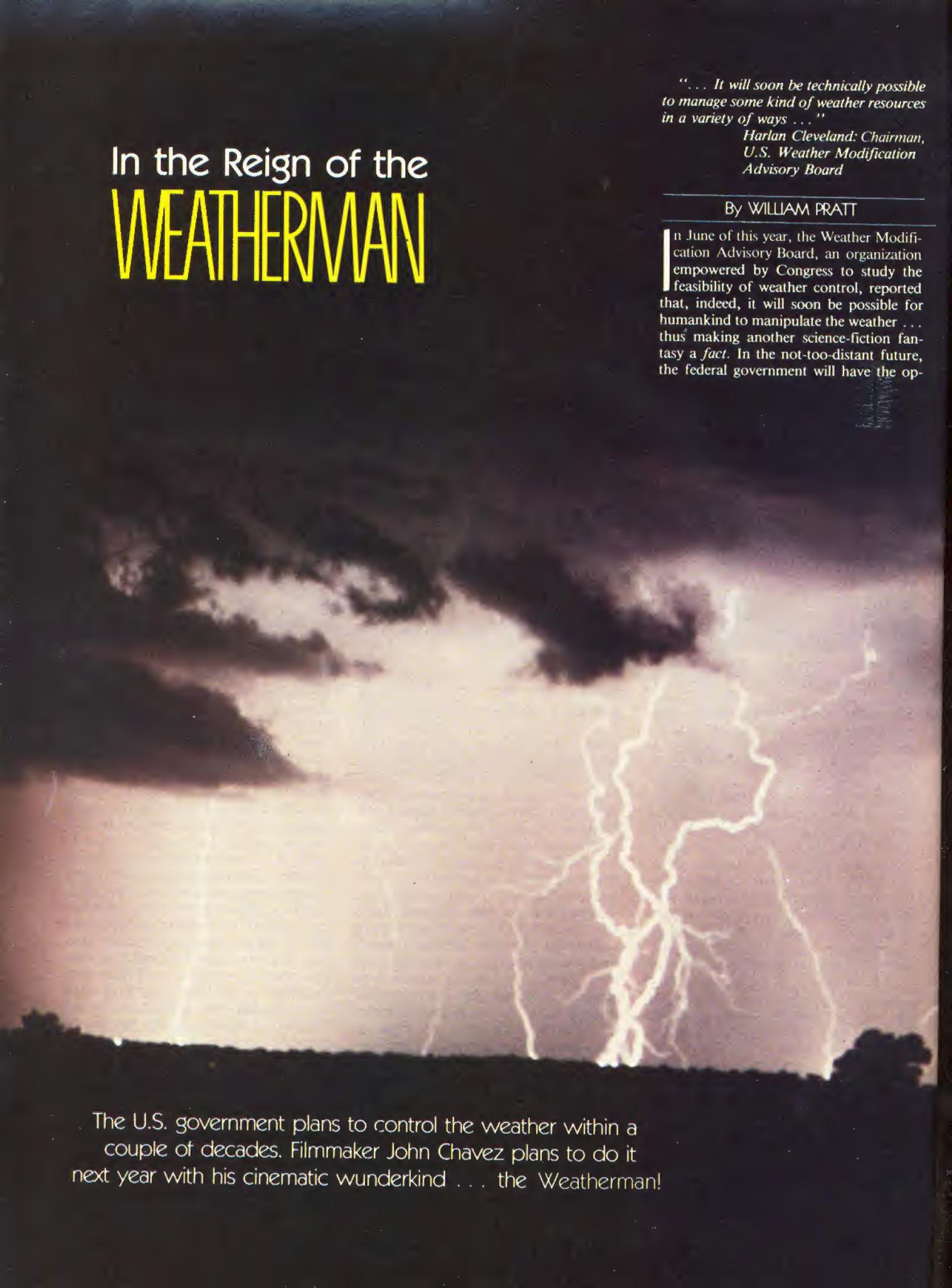
bital plane, compared to Earth's generous season-producing tilt of 23.5 degrees. Circulation processes in its atmosphere, as a consequence, are far simpler and much more uniform than on Earth. In addition, with the planet's permanent cloud layers, there is no change between overcast and sunshine. Also, there are no oceans whose interactions with land masses and atmosphere play such a big role in the formation of weather and climate conditions on Earth.

Beyond that, the slow rotation of Venus does not cause the Coriolis effect which, in conjunction with solar heating, "drives" the terrestrial weather. As a result of all these factors, the weather machine on Venus is quite simple, with almost identical conditions on northern and southern hemispheres. Venus, thus, becomes an ideal laboratory for the likes of meteorologists, climatologists, planetologists and geologists, to conduct controlled experiments similar to those in Earth laboratories where certain parameters are held constant, in order to study other variables.

While the interest of U.S. scientists in the exploration of the mysterious Venus atmosphere was undoubtedly sharpened by the Soviet Venera discoveries, the

American Venus program differs fundamentally from the Soviet Venus missions. It is obvious that the latter place their emphasis on the exploration of the Cytherean surface at specific, circumscribed locations. In contrast, NASA's research program is pursuing a more total planetary strategy. It primarily intends to help answer certain fundamental scientific questions concerned with the cause of planetary phenomena and is developed around these questions. Thus, we must see NASA's Pioneer-Venus project only as a sub-program in a master plan that embraces the exploration of both the inner and the outer planets in search of more universal answers. The main distinction between the two Venus programs, which — to be sure — are coordinated through mutual exchange of scientific data, are the scientific objectives themselves. The quest of NASA's planetary exploration missions is for the origins of the solar system as a whole and their relationships to Earth.

Yes, science is keeping its fingers crossed as Pioneer-Venus 1 and 2 prepare to help unveil the mysterious Mistress of the Heavens. There is a lot riding on these missions for all of us — not just the scientists. Their findings could be significant, even crucial to the preservation of our environment.



"... It will soon be technically possible to manage some kind of weather resources in a variety of ways..."

Harlan Cleveland: Chairman,
U.S. Weather Modification
Advisory Board

In the Reign of the **WEATHERMAN**

By WILLIAM PRATT

In June of this year, the Weather Modification Advisory Board, an organization empowered by Congress to study the feasibility of weather control, reported that, indeed, it will soon be possible for humankind to manipulate the weather... thus making another science-fiction fantasy a *fact*. In the not-too-distant future, the federal government will have the op-

The U.S. government plans to control the weather within a couple of decades. Filmmaker John Chavez plans to do it next year with his cinematic wunderkind... the Weatherman!

portunity to work a myriad of meteorological miracles: creating storms by towing electrical wires through clouds; suppressing lightning by distributing inhibiting fibers beneath thunderstorms; dispersing fog and pollution through the use of solar reflectors; changing the track of rain showers through heat application and increasing rainfall by bringing up the temperature of the ground below.

Science-fiction film fans who don't particularly feel like waiting a decade or so to see these wonders occur need only to bide their time until 1980 when *Weatherman* hits the screen. *Weatherman*: a \$12 million, independently financed excursion into SF futurism created and produced by John Chavez, a 26-year-old college

graduate with degrees in philosophy and communications who has dedicated over five years to the mind-boggling project. Chavez, a movie addict since childhood, is admittedly awed that his very first screenplay is being accorded a multi-million dollar treatment and being talked about some two years prior to completion. "I tried to get studios interested in this for a long time," he marvels. "No one was interested. Nobody was willing to gamble on it. This was prior to *Star Wars* and no one knew whether science fiction was going to be a trend at the time."

Starting off on his own, Chavez was soon joined by Executive Producers Lyn Thompson and Paul Sutherland in the task of getting *Weatherman* off the

ground. Today, pre-production is in full swing with space artist Bob McCall offering design concepts and Joe (*Jaws II*) Alves directing. In Hollywood SF circles, everyone is talking about *Weatherman* — about it being the first filmed look at climate control. But, oddly enough, no one knows what the movie is about.

Much to his dismay, Chavez finds that he has to surround his brainchild in a shroud of secrecy. Seated with Lyn Thompson in an L.A. office, he explains his plight. "I'm petrified of being ripped off by other movies," he grimaces. "Or TV! I mean, we've already inspired a lot of people just by announcing the title! I

(Continued on page 74)



PHOTO: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



New astronaut Dr. Rhea Seddon during water survival training: her career as a surgeon helped land her a job on the space shuttle.

EXTRATERRESTRIAL EMPLOYMENT TIPS

The Key to Planning a Space Career

THINK SPACE

"How do I plan for a career in space?" pops up more and more frequently in letters from readers of *FUTURE*, and our sister magazine, *STARLOG*. We took that question to Carol Rosin, former teacher and former aerospace executive, now an Evolutionary Agent and consultant specializing in space and future education. During her tenure at Fairchild Industries, Rosin worked closely with the late Wernher von Braun in a program to communicate space benefits and goals to the public.

By CAROL ROSIN

Solar power satellites, orbital factories, lunar mining and research bases, orbital colonies, solar system explorers . . . just a few of the futuristic-sounding space goals which look feasible within the next few decades. If the proponents of the High Frontier are right, classified ads at the turn of the century will list jobs for space welders and construction workers, space farmers, space dieticians,

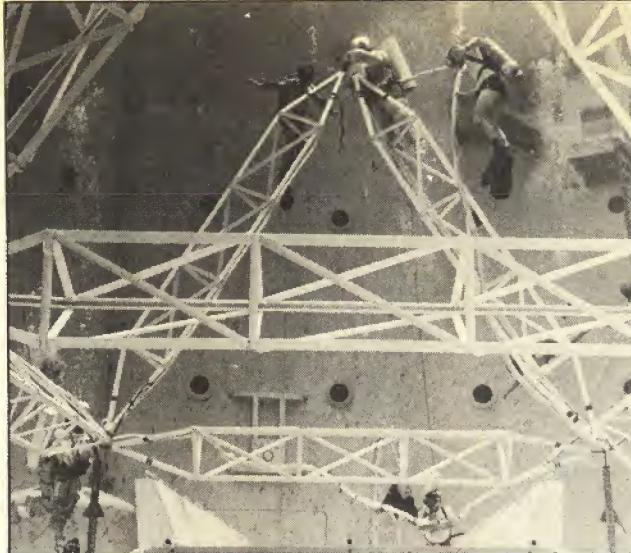
space lawyers, space teachers . . . in fact, the whole spectrum of conventional occupations needed to support human existence. And there will undoubtedly be entirely new careers to follow, jobs we haven't even imagined yet!

The variety of careers related to the planning and development of new technologies and life sciences leading to our future in space promise to be as unlimited as space itself.

How does a person who is eager to participate in the space effort get involved now, in 1978? Stated simply, your opportunities for a career in aerospace are enhanced by your ability to "Think Space." Apply your experience, skills and interests to carve out your own niche in the space program. There is plenty of room for creative thinking.

Space technology has already provided humanity with hundreds of spin-off benefits, from microelectronics and medical advances to agricultural monitoring and a global communications network. By tuning in to existing problems that could be solved by some aspect of space technology—such as population growth, food shortages, dwindling oil and coal resources, air and water pollution, environmental destruction and so on—you may be able to locate (or create) an interesting and valuable space career.

The space job market holds great potential for anyone capable of "thinking



Space careers begin on Earth: analyzing data from Landsat satellites (far left); underwater testing of methods for building in space, to simulate zero-gravity (left); setting up a metal processing experiment for sounding rockets; (below left); developing the instruments for ocean monitoring by satellite (below), at NASA centers across the country. Moving off the planet will require many talented people in a variety of disciplines.



space." The key is to apply your special talents, learned skills and education to the growing arena of space-related careers. Plenty of opportunities will be available—and not all of them will be listed in the usual occupational handbook.

"Astronaut" is the most obvious space career, but there are still far more applicants than jobs for astronauts. This year 35 new astronauts were selected to supplement NASA's existing corps on space shuttle flights. More than 8,000 people applied. Of the 35 selected, not one of them took a course in Astronaut 101. Obviously, they are all super "space thinkers" who know how to apply their skills to exciting opportunities.

One new mission specialist astronaut, Dr. Rhea Seddon, admits she thought her chances for becoming an astronaut were "far-fetched." But armed with the knowledge that a science career was a prerequisite for the job, she established herself in a career as a surgeon. She also earned her private pilot's license. "If there was something I could do to improve my odds, I did it," Dr. Seddon recalls.

Her advice to aspiring young astronauts?

"Develop your science background and

plan an alternative career because this one is highly competitive. And dare to take a chance! If I hadn't, I wouldn't be here today."

Some career paths of her fellow astronauts—medical researcher, professor of aeronautics, aerospace engineer, physicist, astronomer, test pilot, naval aviator, mechanical engineer, astrophysicist, geologist—suggest the variety of occupations that can lead to space.

Although the astronaut job market is highly competitive, it's encouraging to remember that in Charles Lindbergh's day, becoming a pilot was nearly as difficult. With the stepped-up commercial era in space on the horizon, more people will be going into space to live and work and more astronauts will be needed. Last decade's space effort has already created countless new jobs and career opportunities. New disciplines and career interests have emerged.

Many sciences now look to encompass extraterrestrial life by using the prefix "exo": exopsychology, exoanthropology, exosociology, exophysiology and exobiology.

Careers are also opening for research specialists related to space and physical

sciences. Scientists are broadening their scope in the traditional, Earth-oriented studies of geology and meteorology to include space technology. The construction of space telescopes and large radio antennae in orbit will add new dimensions to optical and radio astronomy.

Space law is another growing area. As space activities become increasingly complex, there will be a need for legal and orderly use of the environment. Space law, a natural extension of international law, will provide new opportunities for tomorrow's law graduate. As well, politicians with long range perspectives are needed to plan policy, to encourage private enterprise development and provide optimum human benefit from space activities.

Those who enter fields of education will have to update their courses to include interdisciplinary, futuristic, space and global perspectives. Some educators are already using satellites to broadcast or receive lessons that could not have been achieved with any other method. Space-related curricula, which help prepare one for the space-age world of work, will stimulate more interest in students who are learning to apply their basic skills to the potentially interesting space market.



NASA scientists check out a gravity probe before a recent launch to test Einstein's space-time warp theory.

As humans gain access to the zero-gravity and vacuum environment of space, new challenges will be presented to industrialists, chemists, physicists, metallurgists and pharmacists. As we extend our stays in orbit, there will be requirements for trained technicians, scientists, medical personnel and even repair crews.

It is already apparent that long-range space habitation will call for workers trained in a broad scope of occupations and disciplines, from architectural engineering and interior design to space farming. In case the liberal arts reader should feel left out, there are promising signs that the traditional areas of space studies (math and science) will be increasingly complimented by the social sciences and humanities. NASA recently provided a grant to a group at Georgetown University to study the human aspects of space utilization.

Aerospace engineers have promising career futures in the space business. A forthcoming report by the American Society for Engineering Education states that "the demand for new engineers is already exceeding the supply." *Aviation Week and Space Technology* reports "a shortage of engineers to design, develop and test the nation's space and aviation programs." Graduating aerospace engineers will be able to choose among four or five job offers this year.

Instant global communication and weather satellites are already providing the beginnings of new fields. Satellites will change job descriptions in many areas, such as where satellites provide information on the status of crops, forests, water management, urban growth patterns, resource availability and information relays. Landsat, with its remote sensing devices performing a multitude of services for this planet, has also provided a multitude of careers.

Solar power satellites and the mining of

Source Guide for Planning a Career in Space

A short letter to any or all of the following addresses, stating that you are interested in receiving any literature available on careers in space, should yield some helpful information:

National Aeronautics and Space Administration
Dr. Paul Gardner, Guidance Officer/FE
Washington, DC 20546

American Institute of Aeronautics and Astronautics
1290 Avenue of the Americas
New York, NY 10019

American Astronautical Society
211 Fitzrandolph Rd.
Princeton, NJ 08540

The American Society for Aerospace Education
821 15th St. N.W.
Washington, DC 20005

The Engineers Council for Professional Development
345 East 47th St.
New York, NY 10007

Forum for the Advancement of Students in Science and Technology
1785 Massachusetts Ave., N.W.
Washington, DC 20036

World Future Society
4916 St. Elmo Ave.
Bethesda, Washington, DC 20014

National Space Institute
1911 Fort Meyer Dr. #408
Arlington, VA 22209



the Moon and asteroids will hopefully provide inexhaustible and clean energy and resources for Earth—and for the building of space industries, habitats and better space transportation and communication systems. The careers suggested by these scenarios are limitless.

Another emerging career is that of "Evolutionary Agent." Evolutionary Agents are already working in a variety of positions throughout the world. You may already be, or may choose to be an Evolutionary Agent for your space career. The Evolutionary Agent supports and initiates efforts toward the application of technology for peace, humanity, and for mental and physical evolution into space. Some active agents hold positions in industry, business, government, education, labor, civic and social organizations. Others are thinkers, writers, artists, musicians or independent Evolutionary Agents working on various pro-future projects.

To plot a career in space, first choose your basic area or areas of interest and get a thorough education. While you are earning your degrees, pay close attention to the

Space scientists prepare an experiment to test the effects of zero-gravity on molten metals. At right of picture—not Robby the Robot, but a manipulator arm which will be used when the vacuum chamber is closed. Metals experiments on Earth will solve the problems of building in space.

evolving nature of space technologies and their relation to your field. You will see new career opportunities as the technology develops.

Keep up with progress by reading space and futuristic journals. Join a local chapter of the American Institute of Aeronautics and Astronautics, the American Astronautical Society, the National Space Institute or some organization that will keep you informed. Build up a solid basis of knowledge in your field—space applications will come in on-the-job training, easily when you have a healthy foundation in your discipline.

When you have completed your degrees, seek employment in an industry, a university or a government organization where space projects are underway—or work in a space spin-off area of your choice.

Plan for a space career by contacting your political representatives and expressing your support for an expanded space program and commercial space industrialization ... so there'll be space for everyone who wants to work there.

NEW!

FROM
STARLOG/FUTURE



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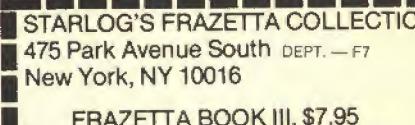
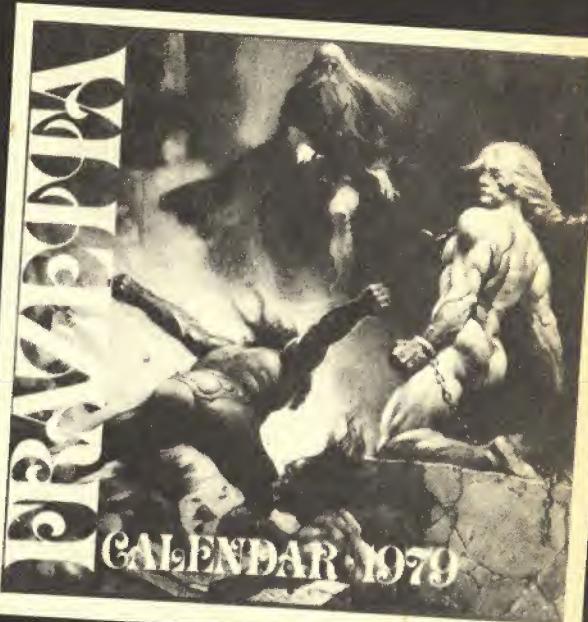
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(Continued from page 24)

TV writer. Some time ago, for example, Gene Roddenberry showed his two *Star Trek* TV pilots at a dinner of the Science Fiction Writers of America in Los Angeles. He suggested that we have our agents get in touch with his office as soon as we had a story outline to 'tell.' If the idea and its development were acceptable, we'd be assigned to do a written outline. When I first went in to 'tell' my story, it was so vague that Gene asked me for additional development. About ten days later, he assigned me to write an outline, which I did. It was subsequently rejected by an NBC overseer in New York.

"Basically, what I'm trying to say is that I have no system for writing outlines. I work my stories out as I go along. Actually, being a *square*, I'm lucky to be a writer at all. Recently, Roger Corman, head of New World Pictures, arbitrarily assigned me to write a screenplay. It took me about six painful months, with kindly assistance from several of his aides. The hardest part of the project, from my point of view, was coming up with an outline. Fortunately they were extremely patient with me and my script, *Computerworld*, was eventually accepted."

At this point in his prestigious career, A. E. Van Vogt is an acknowledged master of systematic creation. There is no limit to his output. During the past decade, for instance, he has revamped his writing habits to allow for the simultaneous creation of six science-fiction novels, working from 11 a.m. to 11 p.m. His *Computerworld* script is on the drawing board at New World, just waiting for the author to complete a companion novelization. And, in Italy, director Luigi (*Stella Star*) Cozzi has optioned Van Vogt's *House That Stood Still*.

Yet, despite his success, Van Vogt still doggedly yearns to crack new systems, develop new insights, new patterns of behavior. "As I've said," explaining his continuous cerebration, "I'm strictly a systems person. I've only gradually extended myself into the world, primarily as a result of adding new thought systems to my repertoire. If I don't have a system for something, I will remind myself of that fact and keep looking at the blank area in amazement. I'm doing that now with TV and film. One of these days an insight will flash at me and I'll have the problem solved. I'm very lucky that I'm patient about all this. I can spend years looking at something until I feel I get it right."

Van Vogt smiles at the thought of his ongoing tenacity. "On all the subjects I don't have systems for, all I can tell people is . . . 'Gee, I don't have a system to explain that. All I can do is speak freely and give you an opinion.'"

And in most literary circles, A. E. Van Vogt's opinion is not something to be taken lightly.

"Weatherman"

(Continued from page 69)

predict that this season Barnaby Jones is going to be chasing someone who's kidnapping clouds!"

Despite the hush-hush status of the project, however, Chavez doesn't mind chatting about its origins. "Over five years ago I started working on an idea about controlling the weather. I was sitting in Linwood Dunn's office when the idea hit me. Linwood is one of the deans of special effects in Hollywood. At the time, 20th (Century-Fox) was making *The Poseidon Adventure* and Linwood saw a return to the big-budget disaster film motif. I happened to have been flipping through an industrial trade magazine at the time which showed pictures of clouds that had been taken by the Air Force.

"I came up with a simple, academic storyline about the controlling of the weather. I looked up at Linwood and said, 'Let's talk about a story about preventing a disaster!'

"Linwood looked at me in a sort of strange way. He said he had never heard of a movie like that and told me to go write it. So I wrote a story from a creative point of view. I didn't just sit back and say, 'What if a big rock fell on New York?'

"I spent the next two years researching everything I could find that dealt with the weather. When I started working on the screenplay, I was able to go back to Linwood and inquire as to how to create various special effects. I'd describe the scene in a narrative and he'd break it down for me as to the technical concepts involved relative to achieving the effect physically, optically or a combination of the two. I was able to write *Weatherman* with an idea of the state of the art in mind.

"But it was a strange experience. I'd be sitting there at my typewriter and I'd get stuck in the middle of a scene. I'd close my eyes and sit back and try to think like a camera. Then, while thinking like a camera, I'd start making these sounds. I would sit there and go 'SSSshhhh' and WWWwwwoshhh.' Then I'd open my eyes and my wife would be standing there looking at me. 'What's going on in here?' 'Uh, I'm trying to compose.'

Shortly after the screenplay was completed, Chavez linked up with Sutherland and Thompson and the great *Weatherman* push was on. After being turned down by a number of studios, the trio decided to finance the movie through independent means. Now the same studios that turned them down are calling and asking about the project. At long last, Chavez is about to see his SF dream become a reality, a prospect which delights him. "I'm looking forward to the day I can walk into a studio when the shooting starts and just go around and touch the sets and touch the actors and see the rushes. It's incredible. I can't think of any other experience like this. I can't imagine anyone not being

satisfied with all this!"

What about *Weatherman*'s audience? Will the movie have enough impact to keep them satisfied? "Well, I can't tell you too much about the plot," Chavez says, "but I can tell you that it's a very special film. It's a positive statement. It's not a disaster film about tornadoes going wild or that sort of thing. We will have our share of special effects about controlling the weather, but it's a story about working with the environment, not against it.

"The *Weatherman* is a man. He's a mortal. He doesn't have a cape with a 'W' on it. *Weatherman* is a rank. It's like a colonel . . . general . . . *Weatherman*. Only it's not like you can be a *Weatherman* with two stars or five stars. There is just one *Weatherman*. What we have projected in the story is based upon what we understand of today's technology. It's a natural extension of what we know today. It's about controlling the weather in the future, maybe 75 or 100 years from now.

"But we also deal with the politics involved in this control, the morality involved. It's also about the effect that weather control has on the hundreds of millions of people on Earth. It's a look at a world where we no longer have to depend on gold or precious gems as an economic basis for a balance of trade. I have envisioned a world where the entire economy is based upon units of water.

"When you talk about the distribution of water in *Weatherman*, you're talking about the pushing of cash all over the world. Once you push water into areas of the world that have never been cultivated, you're talking about increasing crop production and food relative to the balance of trade; you're talking about changing the population of the region. You see, the *Weatherman* is an important fellow."

Chavez catches himself in mid-sentence and forces his boyishly round face into a grin. Has he said too much? Will he say more? He looks to producer Lyn Thompson for advice. She only smiles. "I don't like *not* being able to talk," Chavez shrugs. "But . . . the *look* of the film is a secret. We have to deliver something *totally* special because *Weatherman* is *not* just another science-fiction movie. I wanted to create a science-fact story. 'Science fiction' and 'science fantasy' are terms that are rapidly becoming clichés in the movie industry because of the onslaught of SF films today. We decided that an accurate description of *Weatherman* would be a 'futuristic science drama.'

"But one that's a positive statement," adds Thompson in a conspiratorial tone.

"Oh yeah," Chavez laughs. "I'm very positive about the future. This isn't going to be 1984! My *Weatherman* works with the ecological harmony of the world. Work against it and you have an Irwin Allen disaster film."

The real question concerning space industrialization is not *if*; it is *when*. The answer to that question is, right now—if we want to do it . . .

* * *

A little more than twenty years ago, the Astronomer Royal of Great Britain, Richard Woolley (now Sir Richard Wooley), gave a speech to the Cambridge University Astronomical Society. After it, he made this rather peculiar statement: "I will be happy to answer astronomical questions on any subject with two exceptions. The other subject is the expansion of the Universe, about which I know nothing."

Everybody in the audience laughed. We knew just what he was getting at. You see, a few months earlier Woolley had made a statement that was widely reported in the newspapers: "Space travel is utter bilge."

Woolley is a respected astronomer and astrophysicist, but there is a fair chance that he will go down in history mainly as the Astronomer Royal who made that curiously ill-timed remark. Later in that same year Sputnik was launched (in October 1957) and the Space Age was born.

Since then we have seen a remarkable stream of successes: Yuri Gagarin and the first manned space vehicle, the Mercury and Gemini programs, weather satellites, the Lunar Orbiter, communications satellites, the Apollo Program and the lunar landings, Earth resources satellites, Skylab, Pioneer, the Apollo-Soyuz hook-up, the Viking landings on Mars—the list is astonishing. And with the arrival of the reusable space shuttle, more is certainly on the way. Surely, with such a list of accomplishments, no one would take a lead from Sir Richard Woolley and dispute either the scientific or the practical value of an ambitious, well-funded space program.

Or would they?

Unfortunately, they would. For example, Senator Proxmire has dismissed proposals for industrial space colonies and solar power satellites as ridiculous and impossible dreams that deserve not one cent of public funds. Although the right funding route may be through private industry, not government, I feel that he is terribly and totally wrong about the value of the basic ideas.

I'm not alone in my views. Sitting on my table here are two fat, black-bound volumes. They were published this year by the American Astronautical Society, and they contain ninety-odd scientific papers and over eleven hundred pages, all devoted to the Industrialization of Space. The most impressive thing about these volumes is their practicality—they address applications that can be achieved with *present*

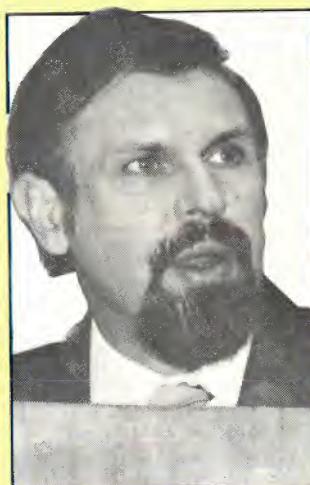
technology, or very slight and reasonable extensions of it. Most of them build on the availability of the space shuttle, due for its first test next year and intended to be the workhorse of the U.S. space program for at least the next decade. Look at some of the subjects that are covered:

- solar power satellites
- solar electric propulsion systems
- space manufacturing, of everything from turbine blades to integrated circuits, from pharmaceutical products to solar cells
- applications satellites (for weather, communications and Earth resources) that can be repaired and serviced in orbit
- nuclear-powered space freighters
- space-borne nuclear reactors, transmitting power back to Earth as microwave energy

generation. For one thing, some of these projects will be very expensive, at least compared with our present budgets for space work. On the other hand, perhaps it's time to take a closer look at how we spend our federal tax dollars.

For instance, the U.S. budget for government expenditures runs about \$500 billion a year. Of that, about fifty percent, or \$250 billion, goes for "human programs" and roughly twenty-five percent (\$125 billion) for defense. Space, as represented by NASA's budget, gets about \$4.3 billion—well below one percent of the total. It is somewhat ironic that, of all the major programs undertaken by the U.S. government in the past twenty years, only one—the space program—can be regarded as a success. The others—the war on crime, the war on drugs, Vietnam, the vast expenditures on welfare, education, health

Industry In Space



Sheffield

Dr. Charles Sheffield may be a new name in the science-fiction world (his first stories were published in Galaxy two years ago), but he is a scientist of recognized stature. Born and educated in England, Dr. Sheffield holds a masters degree in mathematics and a doctorate in theoretical physics. His involvement with the space program began in 1963 and has continued ever since. Dr. Sheffield is a vice president of Earthsat Corporation, a private concern analyzing Landsat data. His first science-fiction novel, *Sight of Proteus*, an idea-packed tale of human form change and space travel, was published this fall by Ace Books.

- permanent space habitats
- space mining from both lunar and asteroidal materials.

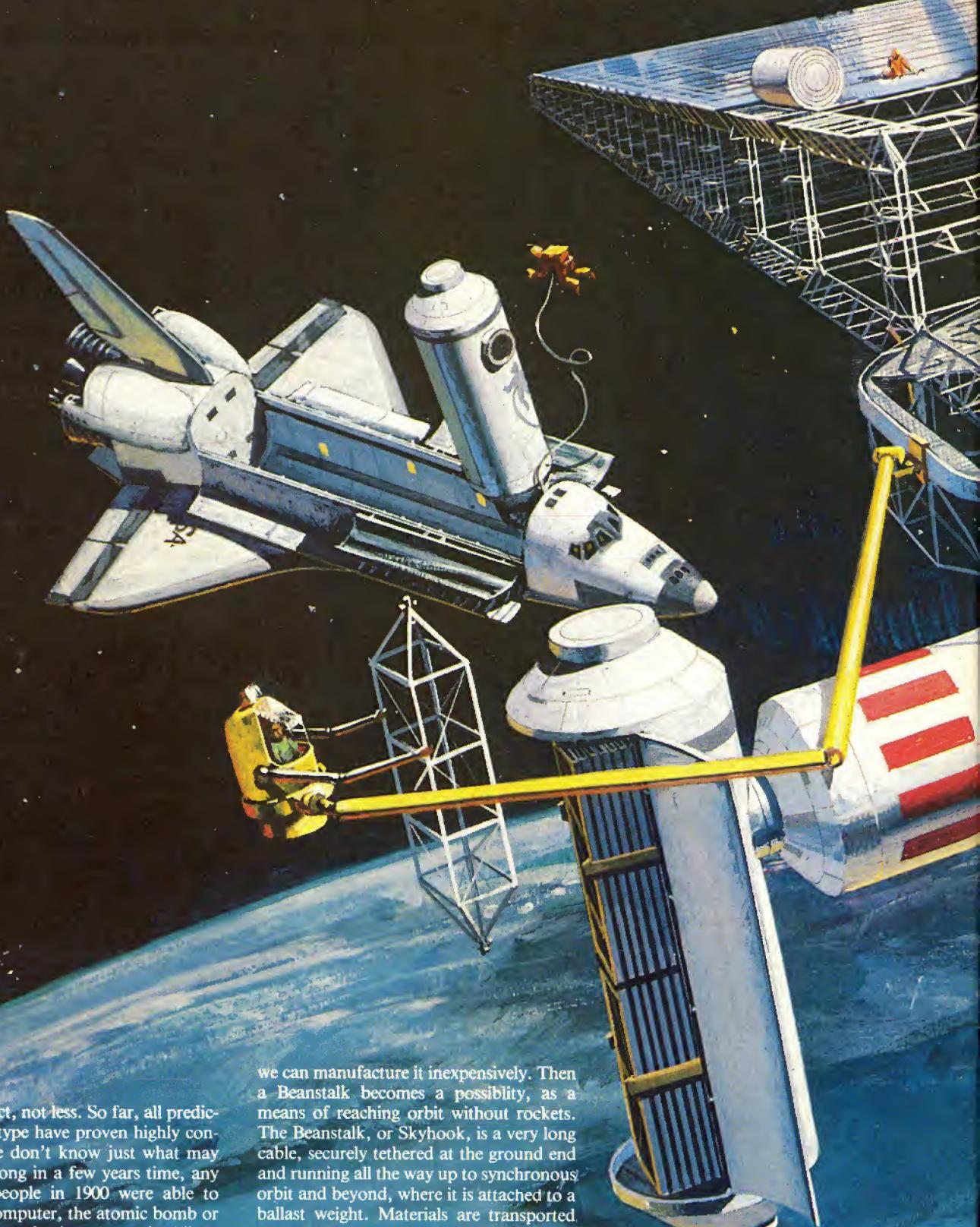
This may sound like a wild list, composed by some far-out lunatic fringe group. Not so. The papers were presented by the good, solid engineering community, from companies that created our present technological base: Boeing, General Electric, Lockheed, Grumman, Hewlett-Packard, TRW, Ford, General Dynamics, Martin Marietta, Rockwell and Comsat. They were backed by the theoretical and analytical resources of MIT, Stanford, Princeton, Penn State and many other universities, and of course by NASA. Detailed calculations were behind every conclusion and supported every suggestion on the list of applications.

Now, it's not likely that we can tackle all the new ideas for space industry in one

care and energy—have been failures to varying degrees.

Perhaps it doesn't pay to succeed. Admittedly, it may be easier to achieve technical goals than social ones. But then, why not spend our money doing the things we know how to do *successfully*, while we are still learning how to tackle the ones we don't understand? In any case, I don't regard space development, in the long run, as any less important than the other activities that absorb huge fractions of the federal budget without apparent results.

It is also most unlikely that we will have to perform space industrialization with no more than our present technology, although if we must, we can manage without new inventions. That is a great tribute to our present industrial know-how, but it's also a safe bet that in the future we'll have *more* new technology



than we expect, not less. So far, all predictions of this type have proven highly conservative. We don't know just what may be coming along in a few years time, any more than people in 1900 were able to predict the computer, the atomic bomb or a global communications network. All we know is that we'll have *something* new, and whatever it is will help us to achieve our technical goals faster or cheaper. And, just possibly, it may transform the situation beyond all recognition.

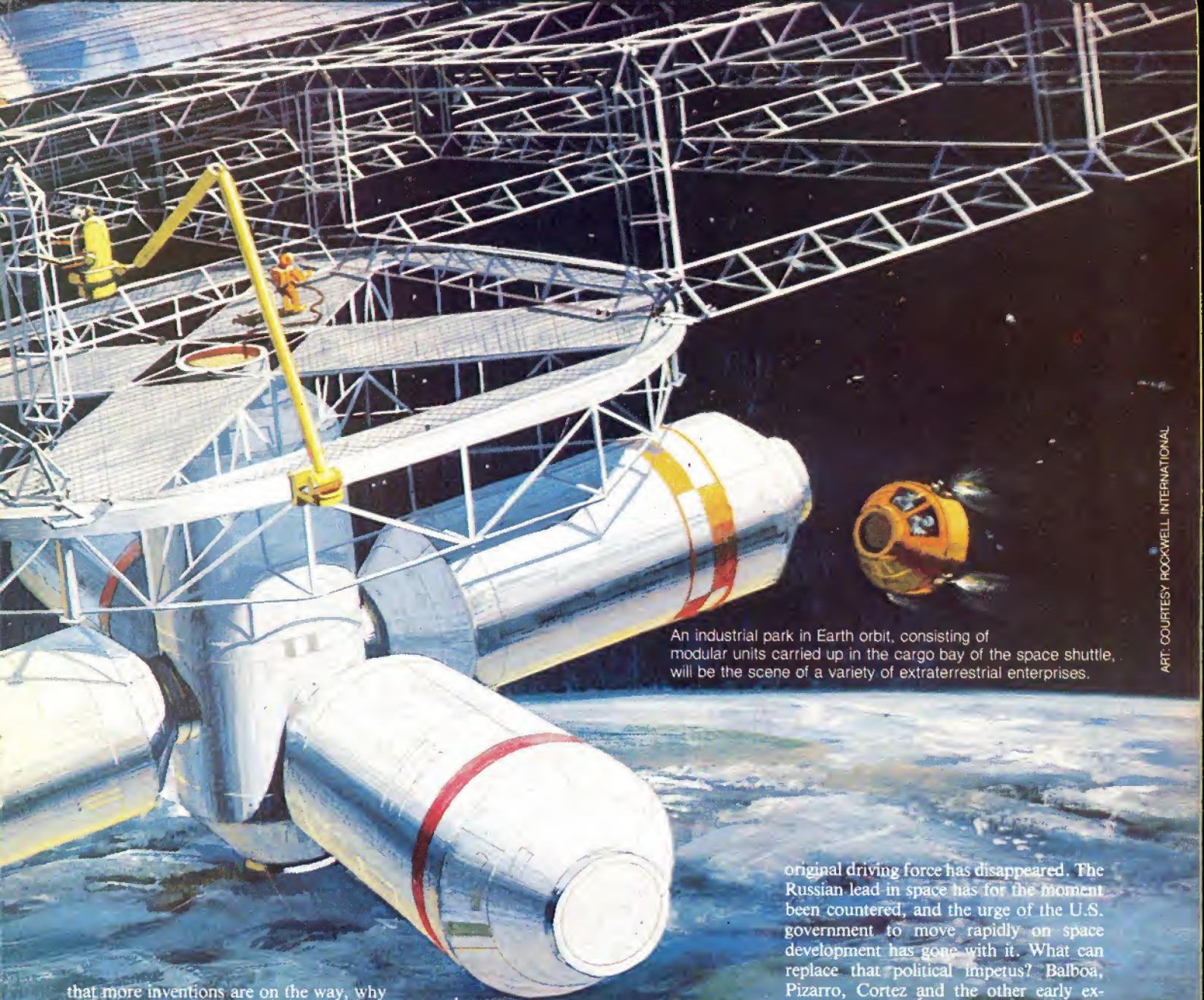
Let's take just one example that would be a "far-out" piece of technological development. Suppose that in the next twenty years a material is developed that has ten times the tensile strength of anything available now, and suppose that

we can manufacture it inexpensively. Then a Beanstalk becomes a possibility, as a means of reaching orbit without rockets. The Beanstalk, or Skyhook, is a very long cable, securely tethered at the ground end and running all the way up to synchronous orbit and beyond, where it is attached to a ballast weight. Materials are transported up and down it by a Jacob's Ladder arrangement—an endless bucket chain. Not a rocket in sight.

Implausible? Certainly. But imagine yourself in San Francisco Bay a few hundred years ago, trying to convince a Spanish navigator that somebody would one day build the Golden Gate Bridge, with a main span of nearly a mile—and that thousands and thousands of carriages, without horses, would cross it every day just to get people to their place of work.

You wouldn't be able to explain to him how it would be done—the words didn't exist in his language at that time. Closer to the present, try to explain computer program de-bugging to your great grandfather. Make no mistake about it, something will come along in the next fifty years that is at least as improbable as the Beanstalk.

If we can do so much with the means available to us today, and if we are sure



An industrial park in Earth orbit, consisting of modular units carried up in the cargo bay of the space shuttle, will be the scene of a variety of extraterrestrial enterprises.

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that more inventions are on the way, why aren't we pressing ahead? Why aren't we hard at work on solar power satellites or the first lunar bases?

This is the most interesting question of all. It involves *motivation*. Space, as a natural home for industry, ought to solve most of the problems that plague us here on Earth. There is an inexhaustible energy source (the Sun) and plenty of raw materials. The difficulty in disposing of waste (including radioactive waste) is minimal. The idea of moving segments of our manufacturing industry to space as soon as possible should be attractive to everyone. Yet, after a tremendously active twenty years, the U.S. space program is faltering and declining, forced to operate on a limited budget that is being eaten away by inflation.

To see the reason for this it's instructive to examine the earlier "expansion periods" of the human race, when the High Frontier was the unknown land beyond the seas, rather than the space above our heads. What is there to be learned

from the Vikings, or from the Portuguese and Spanish navigators?

The motives of the Vikings are a little mysterious, and not well documented. They seem to have been driven by an urge to get away from their womenfolk now and then, plus a desire to indulge in a little rape, pillage and arson in foreign parts. The Spanish and Portuguese, on the other hand, had motives that we can easily recognize and relate to: *religious zeal* and *financial zeal*.

Religious zeal may seem at first sight far from our modern interests, until we realize that the religious wars of the fifteenth century have been replaced by the *ideological* wars of the twentieth.

Proof of this? Ask yourself one question: would Neil Armstrong have walked on the Moon in 1969 if Sputnik had not flown in 1957? The main impetus of the U.S. space program for at least its first twelve years was provided by a desire to "beat the Russians" into space.

More recently (since 1969, in fact) that

original driving force has disappeared. The Russian lead in space has for the moment been countered, and the urge of the U.S. government to move rapidly on space development has gone with it. What can replace that political impetus? Balboa, Pizarro, Cortez and the other early explorers could answer that for us. We need financial *zeal*, the equivalent of the treasures of the Incas, Aztecs and Mayans. In modern terms, we must make space exploration show a profit.

That's where industry comes in. When the thrust was ideology, industry couldn't have more than a supporting role. Only a large government could afford to carry on a space program that had as its main objective a victory in the cold war. Call that the first stage. Industry will come into its own when the second stage ignites and the thrust becomes financial, based on production objectives and serving a market need.

Several factors suggest that we are at that crossroads now between the first and second stage, where the U.S. policy towards space changes from *religious zeal* to business. First, NASA is more and more emphasizing applications, looking for down-to-Earth uses for its satellites.

(continued on page 55)

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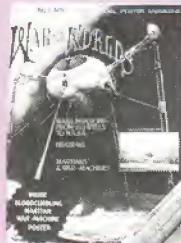
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—perspectives—

This, the seventh issue of FUTURE, is the most exciting one we've put together yet. There are several firsts for the magazine this issue, starting with the front cover. For the first time FUTURE has delved into that part of the science-fiction genre that serves up the future for our daily perusal with breakfast, the SF newspaper strip. And the *Star Hawks* are certainly as up to the task of dishing it out as was their granddaddy in the field, *Buck Rogers*.

Buck Rogers has become a part of our culture and our language over the years, and the strip will soon celebrate its *fiftieth* anniversary. But the spirit of *Buck* has meant more to generations of Americans than just a few catch phrases. In the preface to *The Collected Works of Buck Rogers in the 25th Century*, editor Robert C. Dille writes: "This book records the unique story of how a comic strip became an inspiration to youth. For the most part, its message told youth of all ages that the opportunities of the future are boundless, that science beats superstition, and that education can make all things possible."

We believe that *Star Hawks* follows in that same grand tradition, ably produced by the facile mind of one of SF's mad genii, Ron Goulart, and the skilled hands of one of the comics world's finest artists, Gil Kane. Barely a year old, the strip has already been recognized with national awards and a growing international following. If your local paper doesn't carry *Star Hawks*, write in and ask them to — why miss out on all the fun?

Another first this issue is the "Careers in Space" article, included in response to the many requests we've received from young people asking how they can become a part of the opening of "the final frontier." Feature articles on a wide variety of aerospace career opportunities will be appearing from time to time, keeping you informed as to how you can get involved.

And speaking about getting involved . . . By far the most exciting first in this issue of FUTURE is the announcement of our "Getaway Special" contest. FUTURE is the first magazine ever to offer its readers the chance to bypass the educational, governmental and military bureaucracies and contribute directly to the space effort and the general body of world knowledge. By designing the best experiment package within the prescribed limitations (see page 56), some lucky reader(s) will win this chance of a lifetime. And remember, the design does not have to be the work of one person — team up with your friends, classmates, teachers or associates.

Simplicity and ingenuity may well be decisive factors in arriving at a suitable entry. As simple an instrument as a Geiger counter was responsible for the first major discovery off-planet, the Van Allen Radiation Belts. Dr. Van Allen was told at the last minute that America's first satellite, the Explorer, had room for one more small, lightweight experiment. He decided to include a Geiger counter . . . and the rest is history.

Howard Zimmerman/Editor

FUTURE #8

FUTURE #8 will focus on space science and major upcoming SF films. Look for an interview with former astronaut Wally Schirra, a fascinating feature on the origin and development of planetariums, a revealing look at how satellite pictures are processed, plus articles on the computerized house of the future and a plan for reshaping the solar system called a Dyson sphere. Our SF media coverage will include the two big Christmas releases, Superman—The Movie and the new Invasion of the Body Snatchers, plus a progress report on the filming of Star Trek—The Movie and a look at the making of a space opera, The Adventures of Stella Star.

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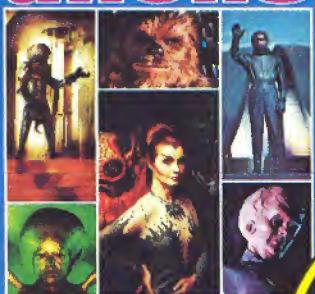
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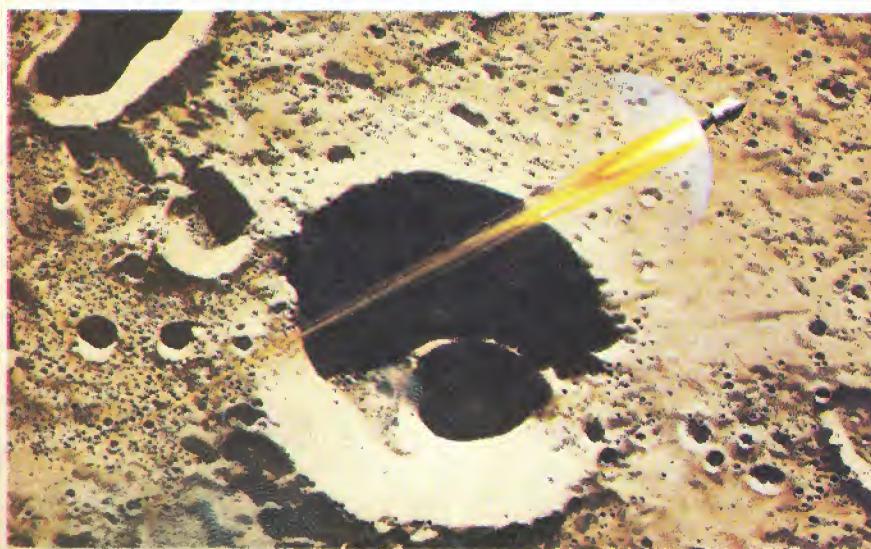
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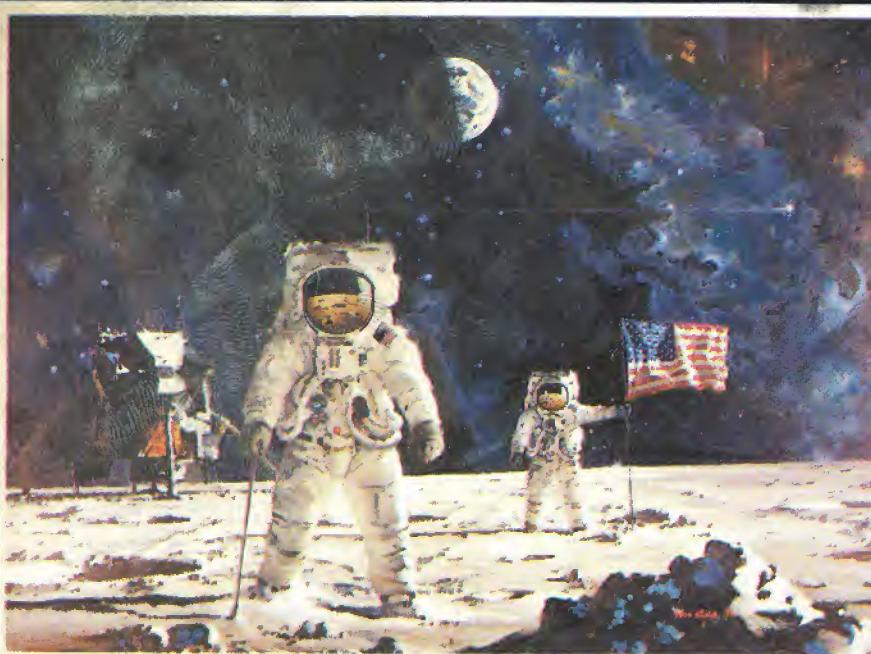
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Frequently commissioned by NASA to do on-the-spot paintings of America's ventures into space, McCall is always present for important launches and splashdowns. His oil paintings have gained international acclaim reproduced as U.S. Postage Stamps, one of which was the first stamp cancelled on the moon, and another, his most recent, commemorated the historic Apollo-Soyuz space rendezvous. McCall's work hangs in important museums, corporate offices and pri-

vate collections around the world, and he has been honored in a one-man space art show at the Smithsonian Institution.

There is no question about it, Bob McCall is the premier space artist of this generation. Now offered for the first time, are three gallery-quality lithographs of McCall's work. These are incredibly detailed, beautifully colored paintings of Man's greatest journeys. Each 24 x 28 inch lithograph is accompanied by a descriptive statement in the artist's own words. The complete edition of all three unsigned lithographs can be acquired for a total of \$18.00. A signed set of three (each one hand signed by the artist) is a total of \$35.00. Prices include protective packaging. This limited collector's edition has been authorized by the artist and FUTURE Magazine guarantees your complete satisfaction.

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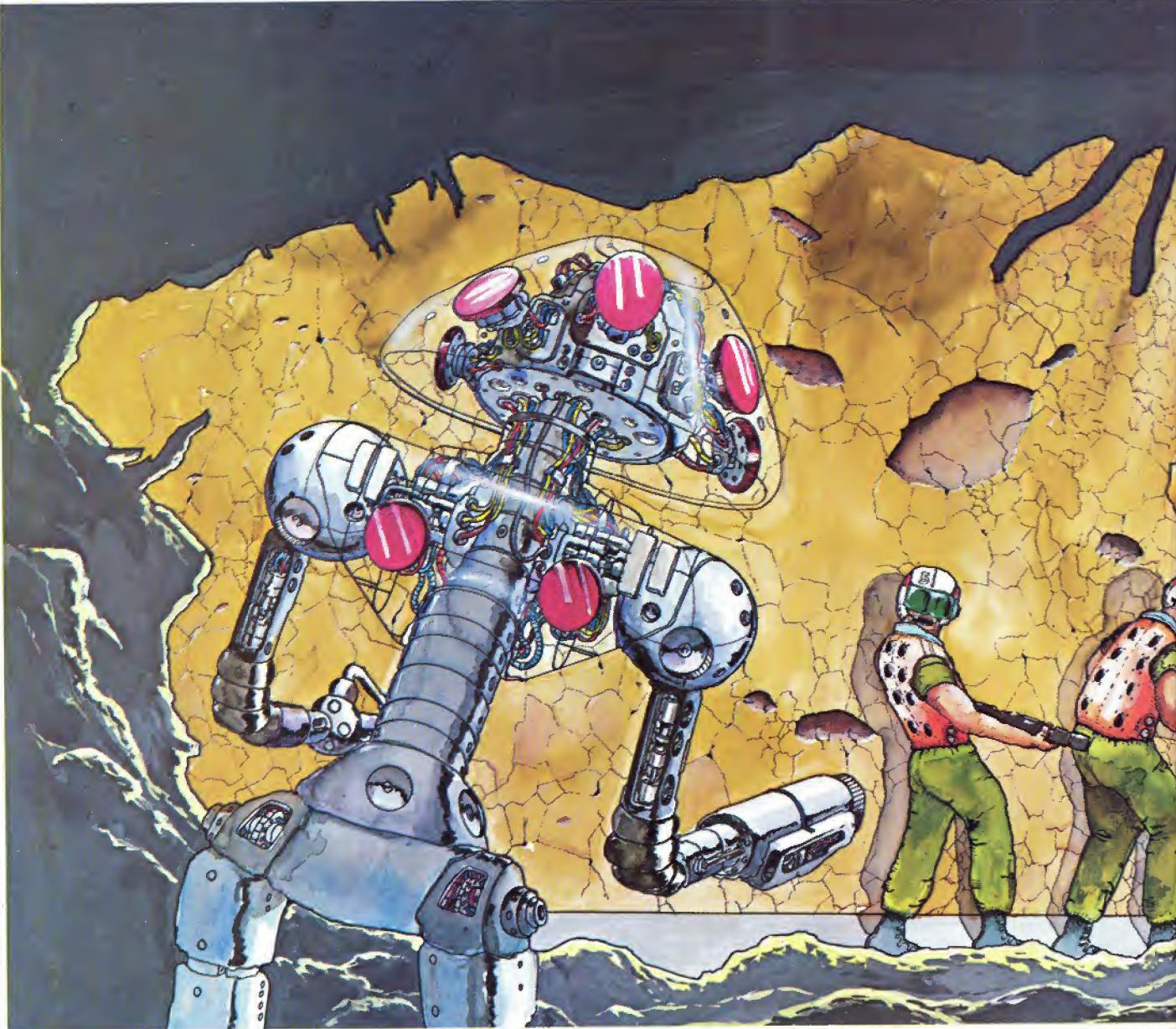
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Realtime: SF Game of Tomorrow?

It combines the military appeal of war games, role-playing aspects of the new SF enthusiasm and space-age technology.

By DAVID HOUSTON

Board games of strategy and tactics ... battles in three-dimensional outer space ... an increasing disinterest in typical movie and TV fare ... electronic tests of skill and ingenuity for home and amusement arcades ... computers for home use ... target practice with bullets of light ... the exploding popularity of science fiction ... where is it all leading?

Vincent Hollier, a Los Angeles inventor, believes he knows. With partner Andrew Woolfolk (a member of Earth, Wind and Fire) he has invested eight months and almost \$10,000 developing a prototype system he calls Realtime. It combines the military appeal of war games, role-playing

aspects of new enthusiasms like Dungeons-and-Dragons and space-age technology; it takes into account the increasing popularity of science fiction and the modern emphasis on physical activity — and the result is a sort of mature, good guys-bad guys shootout played with "real" lasers and functioning, high-powered devices.

"Realtime," says Hollier, "is a system designed to simulate man-to-man combat in a futuristic context that ranges from an Earthlike environment to the vacuum of a barren asteroid."

Some of his inspiration came, he says, from systems in use by the military and NASA — things like the various flight simulators for pilot training and personal combat trainers using "direct-fire" lasers. "Those things aren't just useful," he ex-

plains, "they're fun." But so far they have been inaccessible to the general public.

Hollier's wife Susan (also a participant in the project) adds, "If it weren't for all the death and destruction, war would be fun. Realtime gives you all the anxiety, the adrenalin, a sense of victory or defeat — without the disaster."

A player is equipped to the teeth. He or she wears something resembling battle fatigues. The vest is dotted with light sensors which register pin-point "hits" from enemy laser fire and convey a "destruct" signal to a bright blue strobe light attached to a shoulder; simultaneously, the signal deactivates the loser's weapon. The molded fiberglass weapon contains a battery pack, a noise "blaster," groups of light-emitting diodes which count off the time



ART: VINCENT HOLLIER



Left: Vincent Hollier's portrayal of the SF game of tomorrow. Above: Hollier and partner demonstrate the Realtime prototype. The molded fiberglass weapon contains a battery pack, a noise "blaster," a row of LEDs for timing and recording the number of shots and the infrared laser.

photocell.

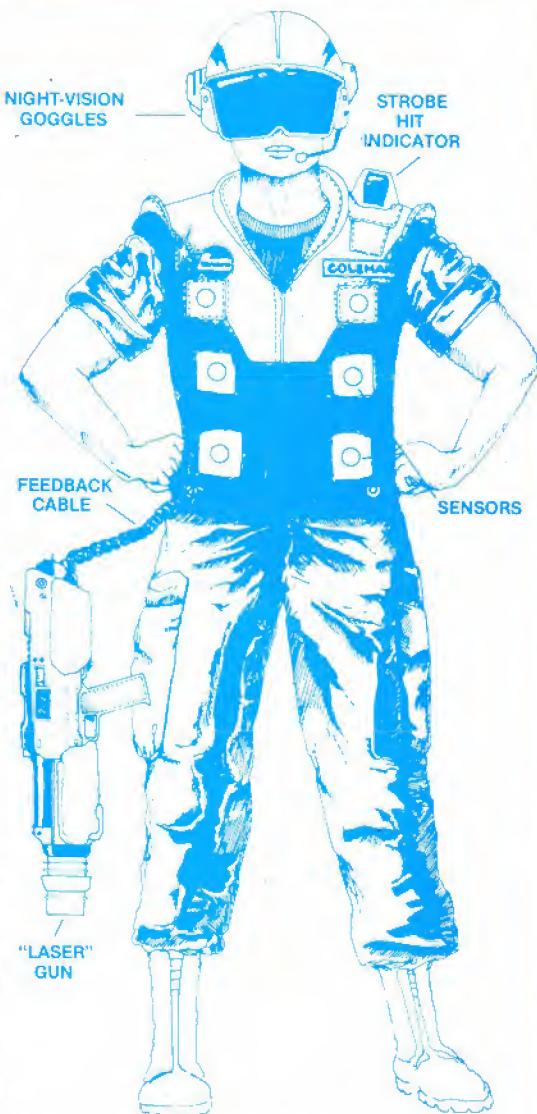
Hollier admits the system will be costly. He envisions Realtime first spreading through amusement parks and arcades, where a would-be player rents equipment, joins a team, gets his "orders" and enters an enclosed, dark battlefield maze. "An old warehouse would be a dynamite place to set one up," he contends. Only economics and imagination would limit the complexity and fascination of the battlefield environment.

It becomes clear, hearing the inventor talk, that he sees Realtime to be as much a game for adults as for youngsters. "If I hadn't invented it, I'd be the first one in line to buy a ticket!"

Although systems like Realtime will undoubtedly remain expensive, relative to other games, later models engineered for mass production ought to be accessible for private purchase by clubs and individuals. (Consider the dramatic drop in price of LED watches and pocket calculators in recent years.) Patents are pending, and negotiations are underway with potential exhibitors.

Vincent Hollier is a long-time SF fan. Among his other accomplishments, he's a painter of spacescapes and a model builder; he recently worked on the redesigned *Enterprise* for the new *Star Trek* movie.

"People are starved for the kind of entertainment that science fiction can give them. It whisks folks away from their dull routines to the outposts of the galaxy." Hollier has a hunch that in the future there will be much more individual participation in that "whisking away," and that games like Realtime might even give movies and TV a run for their money. ■



Above: the uniform-of-the-day for the Realtime player. The sensors register hits firing the "destruct" strobe on the player's shoulder and deactivates the loser's weapon. The helmet has night-vision goggles similar in effect to Luke Skywalker's macrobinoculars in *Star Wars*.

and the number of allowable shots remaining in the "charge," a microprocessing circuit (computer) and a safe, low-infrared laser emitter which can shoot either "buckshot" or an assassin's beam — a "bullet." The Realtime helmet has built-in night-vision goggles (like those used by Luke when he was looking for Artoo in *Star Wars*) and provisions for walkie-talkie and sound effects.

The player is part of a team of five that is pitted against another five-man force on a booby-trapped "battlefield" — where there is a specified objective, and the player has an assigned (or assumed) role to play. The booby traps are electronic versions of the Claymore mine — an anti-personnel device used extensively in Vietnam. In the game version, it isn't metal that goes flying when you take a wrong step and trigger the blast, it's *light* — a wide spray of beams, any one of which can activate a vest sensor and "disintegrate" you. The mine is tripped when a careless foot interrupts a low beam aimed at a

FUTURE INTERVIEW

Fabricating a New 25th Century for NBC's

BUCK ROGERS

An Interview with Producer Leslie Stevens



PHOTO: DAVID HOUSTON

By DAVID HOUSTON

Science-fiction images of the future are not just plucked out of thin air. In *The Time Machine*, H.G. Wells envisioned a distant time ravaged by war and dominated by barbarous mutants, while in his *The Shape of Things to Come* he allowed our posterity to overcome war and plague and struggle to aim for the stars. Books and films such as *Brave New World*, *1984*, *Metropolis*, *Fahrenheit 451*, *The Tunnel* and *Logan's Run* each interpret the glittering and potentially deadly future differently, but with certain haunting similarities. Novelists Asimov, Anderson, Heinlein and others have built calendars stretching many centuries forward, frameworks for their various tales of tomorrow. One creator of classics, Olaf Stapledon, has mapped the entire history of the Universe; his *Last and First Man* spans 2,000 million years!

Creators of these projections are not so mystical as to contend that their futures *will* be; their hope is that while absorbed in the story, their audience or readership will accept that the extrapolated future *might* be. It is the creation of a *realistic* tomorrow that many consider the science-fiction creator's most mysterious ability.

Leslie Stevens is currently in the process of such a creation. The talented television producer is currently helming NBC's upcoming *Buck Rogers* tele-series. It's Stevens' job to take elements from the vintage comic strip and adapt them to the TV format while, at the same time, selecting visual ingredients that will convince his TV audience that the story unfolding is in fact taking place 500 years in Earth's future. Sitting in his office at Universal Studios, the SF veteran (remember *The Outer Limits*?) explains the difficulties involved in unearthing the *Buck Rogers* legend.

"With *Buck*," he states, "you have to

get going from the old comic strip and serials and somehow wind up with plausibility. I distinctly remember carrying a *Buck Rogers* ray gun when I was about four, and going *zap* at things and hearing the gun *click* like a cricket. That was a big deal back then, but now we're faced with the primitive look of the original in sophisticated times. We don't want our *Buck Rogers* to be just a cartoon. We wanted to update it without going so far as to destroy the soul of it." The 1930s look of the 25th Century, therefore, was discarded.

A practical limitation had to be added before creativity could begin. "We have to be very different from *Battlestar Galactica*. Our supervisor, Glen Larson, is doing



PHOTO: ©1978 NBC



Galactica too, and he doesn't want any similarity — partly because there are lawsuits all over the place. It seems that everybody these days is claiming ownership of outer space. Obviously, though, everything now is going to be at least a remote cousin of *Star Wars* and *Galactica*.

"But to make sure *Buck Rogers* has a life and a style all its own, I added a basic notion, a past history. I assumed that there had been, on planet Earth, several great wars and periods of dictatorship, and now civilization was run by a council of computers. The machines were invented by our Dr. Huer, who made them to be as human as possible. But they tend to make the society uptight, a little prissy."

This vision of society was necessitated

by plot and character considerations. "Buck is supposed to be so loose and fun-loving that he breaks Wilma down, teaches her how to enjoy life. So, in effect, he enters a society doing a stylized minuet — and he wants to boogie."

This is the core concept to which all elements of 25th Century Earth had to conform — a free spirit entering a repressed society.

"I thought the way to show this would be to take the society of Edwardian England and extract design elements from it. This is all supposed to be subliminal, not literal. It's *spacey* Edwardian. If you look at the helmets of the fighters, you will see a point in front that curves down — like Bengal Lancer helmets. Imperialistic,

After being lost in space for 500 years, Buck and his spacecraft are recovered by citizens of the far-flung 25th Century.

Edwardian England. You could put a plume on that helmet and ride in the horse guard at Buckingham Palace. The soldiers all have high stiff collars that make them look proud and elegant — and repressed.

"The women's dresses have leg-of-mutton sleeves, a little like a Gibson Girl — though that was from a somewhat later period. I saw those in a book and had them made in all different colors. We added lots of ribbons."

To better entrench the idea of a throwback to an age even more puritan-

ical-looking than 1978, other elements were contributed. "The city is domed and super-modern, but it has flying buttresses. In amongst the settings are a preserved willow tree, a fountain, a Chippendale chair, an antique lamp on a futuristic desk, a cathedral — creating a modern city with echoes of what has happened in the past."

The most significant echo, plot-wise, is Chicago — what is left of it. In the 25th Century of the story, Chicago is a "Lost City," a collapsed mountain of ruins, into which Buck escapes and where he finds the graves of his parents.

"We take it for granted — though this is not an explicit part of the story — that aside from the single domed city, the evolution of the rest of Earth has been disastrous. We just filmed the Chicago scenes the other day. We used the burned-out back lot of MGM, at night. It looks like Berlin after the war — all rubble, with strange creatures sort of covered with leprosy. There is a definite feeling of a swampy deterioration of things outside the doomed city."

For Stevens, the quintessential 25th-Century setting is a ballroom — where Buck shakes up, and loosens up, the Edwardians.

"We wanted a lot of beauty, almost a *Wizard of Oz* quality, like an enormous Tiffany lamp. All around the sides there's a huge rainbow scroll painted on. This is an inexpensive set, but when it's lit from the back, it becomes a jewel. It's just gorgeous."

The rainbow motif integrates the ballroom with many other settings and design elements. "It's in everything — red, orange, yellow, green, blue and violet. It's on their armbands, in the medallions, on the ships." And the jewel image occurs elsewhere as well. "In our model of the domed city, which was based on Saint Michael's Mount (a lushly verdant, lofty island in the English Channel, surmounted by a 12th-Century monastery), we suggested the rainbow motif by sticking tiny crystals of different colors into the structures. When you light it, it glints and shows off refractions like diamonds."

But this is the 25th Century, after all, and there's ample imaginative technology to suggest it. In the ballroom, for instance, "you first hear what appears to be a huge orchestra and there discover this one guy going crazy on 20 keyboards. He hits one chord and you hear 30 violins. And when Buck takes over, two or three little notes make a whole rock group."

To achieve the technology of an Earth engaged in intergalactic space warfare with evil Draconians, Stevens and other writers and designers started with sheer guesswork — extrapolating from the machinery of today and projecting it to wild extremes.

"Working with the guys out at the Venice plant (Future General), where the effects are to be photographed, we started with the simple notion that the spaceships had to look futuristic, had to be what we



PHOTO: © 1978 NBC

Gil Gerard and Erin Gray as Buck Rogers and Col. Wilma Deering. Producer Larson describes Buck's 25th-Century world as "spacey Edwardian. The soldiers ... look proud and elegant — and repressed."

call 'high tech.' "

The high tech approach has already given us everything from the ships of *2001* to the more fanciful fleets of *Star Wars*. Begin with images of NASA and Russian hardware — the Apollo-Soyuz docking, a LEM, a Saturn V — and mold these forms to fit the functions of imaginary fighters and starships. But the *Buck Rogers* crews did not stop with high tech. Story considerations and other fantasies tempered the shapes.

"We see the Draconians as sort of a Mongolian horde. They come down in an enormous spacecraft carrier that has an evil, hooded look to it. And when you see it up close, it's dotted with little yurts (Siberian huts) and minarets" — primitive architectural shapes that the Draconian mentality would be comfortable with. "The Draconian fighters have a sort of Ku Klux Klan hooded look to them."

Carrying through with the Mongolian idea, "the invaders are tattooed all over their faces, with one eye made of a ball bearing which glints in the dark. They wear teeth and claws around their necks. We found a dragon used on a Japanese warship in World War II, and used it as their helmet. Now you put those guys in a spaceship like that, give them that helmet and red goggles — and they look like Hell's Angels coming at you."

Stevens finds the Mongolian culture as beautiful in its way as the Edwardian culture. "It all comes out as stylistic elegance," he says.

In contrast to the wart-covered,

plumbing-coated bad guys' ships, the Earth ships are sleek, shiny and efficient-looking.

Showing sketches of the ships (not available yet for publication), Stevens laughs and adds, "There are huge models of these things. In fact, Universal should send the *Galactica* and *Buck Rogers* fleets to the next Rose Bowl parade. No explanation — just show them. I tell you, we could really freak out the Soviet Union; their whole spy apparatus would fall apart! The ships are rendered in such detail — and really look real."

For *Buck Rogers*, then, the 25th Century is extracted primarily from the story — from its action and characters — and from the general ideas of "high tech" available to those versed in today's science and technology. Once the basic principles of story and design were established, Stevens explains, minor problems "are just solved as we go along."

Some of these minor concerns: "There's a set — a throwaway set, really, that you see for only a short time — which is so tasty and different. It's all white with a solid neon red stripe around it; so simple and yet so striking." This and other settings were designed by Paul Peters. "He's a really super, super designer."

Against that simplicity, consider Princess Ardala's quarters on her Draconian mothership. "She's got this big lovely bed, with four, blue neon posts, and steps leading down from it to a swimming pool. That's really a shocker in a spaceship! All that opulence."

There's a robot, Twiki, who carries around a sentient robot, Feo, attached to its neck, who talks, blinks its eyes and changes colors according to mood. Finding an actor to do the voice was a problem — until someone had a brainstorm. "I think this can be revealed now. The guy who spoke for Hal, in *2001*, will be Feo's voice. So we'll have that sort of patronizing personality — and we'll simultaneously tip our hats to *2001*."

On the Draconian ship, "there's a design element that runs through every single set — a groove, a channel in the wall in which there is cabling that's colored red, purple, orange and green — all numbered and technical looking. Everywhere you go you see this one heavy, naked technical thing, the spine of the ship, out of the corner of your eye."

Peters startled the production staff "by painting the interior of the Draconian ship rust-colored — not the battleship gray you expect it to be. Somehow it implies weather and rust and decadence," while creating a very colorful environment.

Some design elements defy common-sense projections for the future. "Probably, some day soon food will be miniaturized — especially for space travel. With your little emergency kit, you won't have to worry about nutrition for the rest of your life. Well, we can't do that, because dramatically we have to stop for meals so people can talk. And we have to have them stopping to get food, and so on. Let's call that one of the humanizing aspects of TV space shows — made for the part of the audience not sympathetic to space fiction. We make these concessions for Middle America — Oklahoma and Kansas — which just isn't all that interested in those things flying around and lighting up. But it turns out very well for us because it does lend a certain odd stability to the whole thing."

The problem of creating food for the future became the problem of simply creating odd stuff to eat. "We needed an alcoholic drink, so we invented Vinol — which can be ordered in any 'proof.' I've spent lots of time in the Universal commissary inventing foods with the chef there. We did weird things with orange peels, Kiwi fruit, canteloupes ... we attached a lobster claw to a chicken. Mainly, it all just had to look *different*."

All of the issues discussed here were faced and solved for the first of the three, two-hour *Buck Rogers* pilots ordered by NBC — which is to air, "Oh, sometime between November and the end of January this season," according to an NBC representative. At the time of this interview, *BR-I* was almost "in the can," *BR-II* was being storyboarded and *BR-III* was just being written. While *II* and *III* will present new problems, the basic 25th Century devised for the first pilot will be reused. "All those millions of dollars spent initially have to be made to pay off in the long run."

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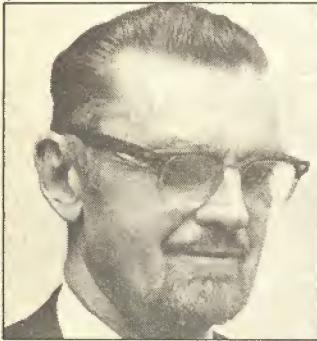
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future forum

Future Forum is designed to expose our readers to the thoughts of a variety of experts in the fields of science fact and science fiction. Each issue will pose a new question to our "guest panel" on a particular aspect of SF, space-age technology or future trends.

If you had a budget of \$10 billion to develop any futuristic project . . . what project would you choose?



L. SPRAGUE DE CAMP

Editor and author of *Lost Continents* and *Lest Darkness Fall*.

I would put it into archeology research and saving the whales. Otherwise I'd use some for longevity research.



BJO TRIMBLE

SF artist, fan, writer and editor.

I suspect I'd put most, if not all of it, into medical research. There is no reason why we could not put every great medical mind in one place and get them to work at eradicating all kinds of horrible diseases which have no good reason for existing any longer on this planet. The money could go into developing a space station research center where things could be studied without the hassle of gravity. Take a quick walk through your local school for the handicapped sometime and think of what else you'd spend that money on!



CHARLES H. SCHNEER

Producer of *Mysterious Island*, *First Men in the Moon*, *Jason and the Argonauts*, *The Seventh Voyage of Sinbad* and *The Three Worlds of Gulliver*.

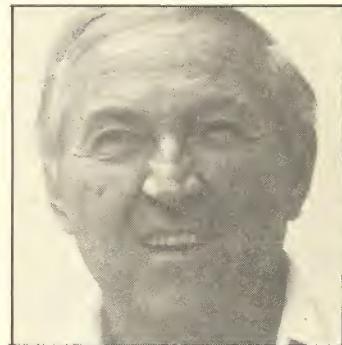
With a budget of \$10 billion (or is that a typographical error) one could develop anything, perhaps even a movie about a studio head who offered such a budget. But it would have to be a comedy.



GAHAN WILSON

World-renowned cartoonist for *Playboy*, *The New Yorker*, *Punch*, *National Lampoon* and the *Magazine of Fantasy and Science Fiction*; designer for Phil Kimelman Animation and author of *And Then We'll Get Him* and *I Paint What I See*.

I would pour it into searching out realistic methods of protecting the ecology.



GEORGE PAL

Producer of *The War of the Worlds*, *The Time Machine*, *When Worlds Collide*, *Destination Moon* and *Doc Savage: Man of Bronze*.

If I had a budget of that size I would most certainly put it into solar energy, space exploration and, with the money left over, into some good SF pictures.



JOANNA RUSSELL

Author of *Picnic on Paradise*, *Chaos Died*, *The Female Man*, *We Who Are About To* and *The Two of Them*.

In middle age one stops being quite so fascinated with toys and hence not quite so technophile. I would do what I could to eliminate hierarchy from human life — a tall order but one on which I believe everybody's happiness depends. By hierarchy I mean sexism, racism, class, every form it takes. And I would begin by buying out *FUTURE* and taking a good hard look at its editorial page: Norman, Kerry, Howard, Ed, David, Richard, Ira, Bob, David and Tom. Not to mention Ron and Jesco. Half your production staff and two thirds of your art department are female, period. This is not only unfair but stupid — you are limiting your outlook on the world, which is the last thing SF should do. Go read Asimov's article in your own first issue.



MARION ZIMMER BRADLEY

Author of *The Heritage of Hastur*, *The Shattered Chain*, *The Sword of Aldones*, *Darkover Landfall*, *The Planet Savers*, *Stormqueen* and *The Spell Sword*.

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LARRY NIVEN

Author of *A Gift From Earth*, *Neutron Star*, *Ringworld*, *The Flight of the Horse*, *The Long Arm of Gil Hamilton* and *The Protector*.

I would put an industrial base on the Moon. By the time the ten billion was gone we'd be making money.



DR. MARK R. CHARTRAND

Chairman, Hayden Planetarium.

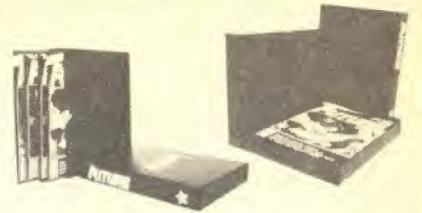
All my futuristic ideas will cost more than a few gigabucks. But for this amount I would pursue large-scale computer modeling of weather and climate. It may be that the scale of the problem is too large even for this sum, but at least we could be much further ahead than we are now in a field that is about as vital as you can get.



POUL ANDERSON

Hugo and Nebula award-winning author of *Tau Zero*, *Operation Chaos*, *A Midsummer's Tempest* and *The Earth Book of Stormgate*.

I would definitely be aimed at getting a permanent foothold in space. Just what form this would take, nobody can quite say yet, so I'd begin by funding some large-scale, realistic studies. Obviously no foothold can be permanent unless it is profitable, so in effect, I'd like to put up a permanent Skylab or two, supplied by space shuttles, devoted partly to basic science but partly also to industrial research. If it turns out that, say, ball bearings and certain pharmaceuticals are best produced in free fall . . . you can leave the rest up to the manufacturers. F



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CLONE MASTER

Edited by ED NAHA

Anyone who has been watching television for the past eight weeks or so can testify that the current television season is almost as confusing as last fall's onslaught of shows. Starting off with an ill-timed bang, the 1978-79 brigade stumbled to a start amidst a countless number of specials, telefilms and TV pilots aired during a two-week blitz in early September. As bedazzled viewers attempted to sort their way through the return of *Roots* and the hourly *Big Event*, network programmers took note of the strongest new entries and made plans for potential

series-to-come.

One of the biggest winners of the new season seems to be NBC's *The Clone Master*, which looks like a good bet to become a series later this season. Starring Art Hindle as Simon Shane, the impressive telefilm recounted the tale of a scientist's efforts to clone thirteen copies of himself. The proposed series would trace the adventures of one clone each episode.

The heads of NBC-TV seem to feel that *The Clone Master* concept would be a very topical arrival in terms of today's current test-tube-oriented events. The show's writer, John D.F. Black, is quick to point out, however, that Shane is not a creation-come-lately. "The show's producer, Mel Ferber, sold the title *The Clone Master* about two years ago," he says. "But it

wasn't until cloning got big this year that he was given the go-ahead. I was brought in to develop the idea. What nobody really knows is that the series had its beginnings over thirteen years ago when Mr. Ferber was producing *The 21st Century*, a news documentary show hosted by Walter Cronkite. The show went out to the University of Michigan to report on the first real cloning experiment. Mr. Ferber got an idea about a potential fictional portrayal and now, over a decade later, we're hot!"

John Black, a veteran of *The Man from Atlantis* and *Star Trek*, has great faith in *The Clone Master* as a potential hit series. As of this writing, so do the folks at NBC.

Right: Art Hindle as Clonemaster Simon Shane with offspring (inset) assistant

TV AT A GLANCE

Ken Johnson (the executive producer of *The Incredible Hulk*) is putting together a creepy telefilm entitled *The Plants are Watching*, an SF thriller about a species of super-intelligent plants who decide that they're mad as hell and not going to take it anymore . . . In case *The Swarm* didn't cause enough of a buzz

on the killer-bee front, CBS is readying a sequel TV film to their own *Savage Bees*. This time out it's *The Return of the Savage Bees* . . . The same network is readying an "all new" *Star Wars* TV special for the Thanksgiving holiday which will include some animated footage . . . Phil DeGuere, the writer-producer-director of TV's *Dr. Strange*, has just finished the first draft of his proposed Universal

telefilm based on Arthur C. Clarke's *Childhood's End*. The movie, if given the green light, would be one of the most ambitious science-fiction projects ever proposed for television. *Childhood's End* was originally slated to appear on the tube as an animated special produced in Australia . . . budgeting problems and contract difficulties caused that endeavor to be abandoned only a few months back.



THE MARTIAN CHRONICLES

Work has finally begun on NBC's mini-series, *The Martian Chronicles*, a show based on elements of the story by Ray Bradbury. The three-

part, two-hour *Chronicles* was adapted by Richard (*The Incredible Shrinking Man*) Matheson and is being directed by Michael (*Logan's Run*) Anderson, who makes his TV debut with the production. The mini-series was slated to roll earlier this year but

Left: Ray Bradbury (inset) tackles TV. Far left: Burton Cooper in the L.A. stage version of *Chronicles*. Near left: another face of Cooper in the same production along with Barbara Beckley.

ran into budgeting problems. The current effort is being produced jointly by Charles Fries and Dick Berg (via their separate production companies) with additional financing being provided by the British Broadcasting Corporation and the German TV company, Polytel. The big-budget *Chronicles* (costing in excess of \$7 million) will be filmed in England, with special effects being provided by John (*Star Wars*) Stears and camera work by Ted (*A Man for All Seasons*) Moore.

Rock Hudson will star as Captain Wilder, a character taken directly out of the book but amplified for the series. "We actually expanded that role to be a kind of connecting link between episodes," producer Fries commented recently. "He will narrate and take the viewer from one sequence to another." No airing date has been set as yet by NBC.



THE SHAPE OF THINGS TO COME:

While network programmers are busily forming plans for the upcoming "Second Season's" replacements and specials, Canada's CTV network is readying what may be one of the most ambitious, and riskiest, syndicated science-fiction TV shows ever to reach the States. A few months back, CTV announced plans to film *The Shape Of Things To Come* as a weekly, half-hour, \$200,000-per-episode series. Although the title is derived from the classic H.G. Wells work (made into a film by Alexander Korda in the 30's), the plotline will be totally original.

The show will present a less-than-rose-colored view of the not too distant future wherein, after an all-out world war, the citizens of planet Earth are reduced to a barbaric state. Civilization is kept afloat in a highly sophisticated Moon colony whose residents, while well-meaning, are somewhat priggish. Conflict between the two tribes of humankind will be the basis of the show. Starring in the adventure are

PHOTO: © UNITED ARTISTS



Nicholas Cambell as a Moon resident and Koo Stark as a woman of the future. The two, twenty-one-year-old actors will be joined by a robot called Sparks (created by *Star Wars*' John Stears) and a master-computer, Lomax, in their search for a

In the original *Things To Come*, Raymond Massey starred in a script penned by Wells himself. The new version will be a drastic TV update.

perfect society.

Helming the activity is veteran Canadian producer Bill Davidson who, with creative consultant Sylvia (*Space: 1999*) Anderson, will make sure the *Shape of Things to Come* runs smoothly. □

Spaceship San Diego

Visiting the Reuben H. Fleet Space Theater & Science Center

By DAVID HOUSTON

Most visitors to southern California know about Disneyland, the Universal Studios movie tour and the like; and readers of this magazine can likely add Mount Palomar Observatory, NASA's Jet Propulsion Laboratory and the Vandenberg shuttle launch site. But there's one attraction for the science-minded that does not have the national reputation it deserves. It's the Reuben H. Fleet Space Theater and Science Center in Balboa Park, San Diego, California.

The center offers a fixed exhibit which includes a large cloud chamber for spying atomic particles, tests for mechanical advantage, studies in light and color and optical illusion; it offers (irregularly) lectures and classes in astronomy and the physical sciences; and the lobby gift shop must be counted a main attraction: it is a veritable supermarket of science and science-fiction items.

The attraction which makes the Fleet Center unforgettable, however, is the multi-media presentation shown on the 76-foot hemisphere dome—the largest screen of its kind in the world—which culminates in about 25 minutes of motion picture shot in super-clear Omnimax and projected over the dome, with eight-track stereo booming from 152 speakers behind the overwhelming picture.

The center's director is Jack S. Laney—retired U.S. Navy pilot, holder of masters degrees in both aeronautical engineering and psychological counseling, administrator and teacher, avid space sciences enthusiast. He talks about the big show on the dome:

"Our Omnimax shows come from several different sources. First, we can actually contract for a film ourselves, and we have done so with three different films." One such was *Voyage to the Outer Planets*, which employed models and spaceships extensively. "We contracted that work out to Graphic Films of Hollywood. They do a lot of work for

PHOTO: DAVID HOUSTON



Above: museum and planetarium shops are veritable treasure troves for today's space-minded youth — the Fleet Space Theater shop is no exception. Right: an audience at the Fleet Space Theater is taken on a voyage to the outer planets on the domed Omnimax projection system.

NASA, but using our large-film-format Omnimax presented special problems for them. They were completely successful, though, and gave us special effects as good as any around.

"We've also contracted Imax Entertainment, Ltd., of Toronto, to make films for us. They did our *Ocean* feature. That's an expensive way for us to go, however. It costs a minimum of \$14,000 per minute of film. For any 25-minute feature (which is a normal length for Omnimax) a film is going to cost between \$250,000 and \$400,000, depending upon the shoot-to-print ratio." A ratio of one foot used to every five shot is considered unusually good. "Jacques Cousteau, on his underwater stuff, will do about fifty to one!"

PHOTO: COURTESY FLEET SPACE THEATER







The Navy's famous flying team, The Blue Angels, is one of the attractions of *To Fly*. The film was made for showing at the Smithsonian's Air and Space Museum in Washington, D.C. on a screen 50 feet high and 75 feet wide. *To Fly* was shot with extreme wide-angle lenses, however, so it can be shown on the dome of the Fleet Space Theater. The theater has been dubbed Spaceship San Diego as an expression of the degree of audience involvement possible with the exciting 70 mm, 15 perforation format. Each frame is roughly three times the size of a normal 70 mm frame.

"Our yearly budget is just over a million dollars, so we can afford only one production a year. Yet we need two. So we have to have other sources. Imax and Omnimax use the same cameras and projectors—which deal with a 15-perforation, 70-millimeter frame." That's a picture roughly three times the size of conventional 70 millimeter; it is created by feeding film sideways through the camera and relegating the sound tracks to separate 35 millimeter tape. "Imax is projected onto a flat screen, while Omnimax utilizes a fisheye lens for projection onto our dome."

"We now have an adaptive lens that allows us to project the film shot for Imax onto the dome with no distortion. This means that I now have access to the whole Imax library. I can lease an Imax feature for about \$18,000, and that's a far cry from the \$250,000 cost of an original production."

"There's yet another source available—a lease from a private company. Our current attraction is *To Fly*, which was made by Francis Thompson for Conoco at a cost of around \$750,000. That film was made for showing at the Smithsonian's Air and

Space Museum, in Washington, D.C., for projection onto their five-story, flat Imax screen. But it so happens that *To Fly* was shot with such wide angle lenses that I can show it here as Omnimax, without the adaptive lens. It covers the whole dome.

"A new film is being made by Johnson's Wax for the Aerospace Museum, which will be available for leasing in the spring of 1979. I'll be able to show that in Omnimax, too."

"One area that's theoretically available is for us to go out and get a sponsor to do a film for us. We haven't been able to pull that one off yet, but we do have two irons in the fire. One is for a show called *Tomorrow in Space* that might be made by an aerospace firm. There's a good possibility that we'll be able to get the Omnimax camera on the first orbital flight of the space shuttle. If that happens, it's going to be one terrific operation!"

The non-Omnimax portion of the show in the Space Theater uses all the tricks available to any planetarium director—and then some. The planetarium shows are organized around a theme, such as extraterrestrial life, written as tightly as

any documentary and narrated by accomplished actors.

In addition to the usual star and planet projectors, the Fleet Center has more than 80 conventional projectors at its disposal—to image slides of all shapes and sizes and motion picture footage from 16 to 70 millimeter. In addition to the 152 speakers behind the dome, there are 56 individually controlled speakers under the seats. (The auditorium accommodates 350 customers per showing.)

The planetarium show playing with *To Fly*, through the summer of '78, is *Skyfire*, which was produced by the Space Theater staff under the direction of Joseph Herrington, from a script by Rue Dolan, narrated by actor Vic Perrin. *Skyfire* breathtakingly explores the visual phenomena of the sky, including lightning, rainbows, St. Elmo's Fire and the aurora borealis.

Local advertising has called the Fleet Center "Spaceship San Diego"—expressing civic pride and touting the exciting experience visitors to their area have in store. The metaphor may be a bit stretched, but in this case it's perfectly honest advertising. F

Tomorrow

(Continued from page 77)

Second, a German group, OTRAG, is developing a series of commercial launch vehicles and a launch facility. It is not yet clear how viable that idea is, but private industry has been willing to invest many millions of dollars in it. Third, the idea of an Earthport in an equatorial free trade zone is steadily gaining interest in the international community.

Many people who were active in the early days of the U.S. space program bemoan these changes, particularly the lack of apparent interest on the part of the public in space affairs. They pine for the old days ... of space spectacles and almost unlimited research budgets.

Personally, I think the change is a healthy one. Space development had to move beyond the gee-whiz stage before it could amount to anything really important. If the public yawns at Apollo-Soyuz, and sleeps through the shuttle launches while flocking to see *Star Wars* for the fifth time, that's fine. It means that we are past the stage where a successful launch is a surprise, or a rendezvous and docking a newsworthy event. The prologue is over and we are ready for the real, routine work of space utilization.

The cliff-hanger lunar landings had to pass before industrialization could begin. It is not enough that space be accessible to a few perfect physical specimens. It must be open to the rest of us, to people like me with one good eye and a tendency to dizziness in high-speed elevators. The space shuttle is a big step in the right direction.

* * *

There is one final point that must be made. I have presented space as a place of unlimited potential, with abundant energy and raw materials. Is that potential real? Isn't space a collection of bleak, useless rocks, surrounded by vast regions of hard vacuum? Does it really have value to the human race?

I think it does, but it's not easy to give a proof of that. The most convincing argument I know is provided by the following speech:

"We all know that it has more than three times as many mountains, inaccessible and rocky hills, and sandy wastes, as are possessed by any State of the Union. But how much is there of useful land? How much that may be made to contribute to the support of man and of society? These ought to be the questions ... the agricultural products of the whole surface ... never will be equal to one half part of those of the state of Illinois; no, nor yet a fourth, or perhaps a tenth part."

Is this Senator Proxmire, talking perhaps about the Moon, or the surface of Mars? It is not. It was said by one of his predecessors, Daniel Webster, addressing the U.S. Senate on the 27th of June, 1850.

He was talking about California. □

Space Probes

(Continued from page 38)

up" flight plan. The probe is to be launched in June 1985 and will intercept Halley's Comet in December 1985 as the famous comet passes near the ecliptic on its highly inclined, highly eccentric retrograde orbit. Rendezvous is out of the question, since the relative velocities of the probe and comet will be about 35 miles per second. However, a small sensor probe may be deployed from the mother ship for a plunge into the coma and perhaps the nucleus of the comet.

Using its ion drive system, which expels ionized liquid mercury via the power of a 25-kilowatt solar electric panel, the probe will then jockey its orbit to match that of the short-period comet Tempel II. Since Tempel II is a much "quieter" (burned out) comet, there will probably be little danger in approaching it closely. Sometime in 1988, the probe will match orbits and close in, perhaps to the point of a gentle "docking" with the remnants of the dusty snowball.

There is plenty of room in that modest launch schedule for more "fast" missions, voyages that take only a year or two. A more sophisticated Venus orbiter/mapper with imaging radar is one good candidate. Follow-on Mars landings continue to attract interest.

The proposed Martian rover is the most sophisticated robot explorer in the foreseeable future. Developed by the Jet Propulsion Laboratory for NASA, the intelligent machine could travel 100 miles across the red planet, functioning as a rolling 3-D photographer, surveyor and chemical lab for curious scientists back on Earth. Carrying more than 200 pounds of scientific instruments, stereo cameras and advanced computers, the Mars rover is capable of operating independently, without detailed instructions from Earth.

The Mars rover could land in 1984, say JPL scientists. But a Mars rover mission is not yet funded or approved.

Even more distant destinations beckon Earth scientists. A 1977 study proposed landing a Viking-type scientific package on the surface of Titan. This Earth-like moon of Saturn has a heavy atmosphere and scientists want to search there for possible life forms. The Titan lander's mother ship would orbit Saturn, essentially showing us two "planets" for the price of one.

Many more interplanetary missions tempt Earthbound scientists. It remains to be seen how many will be carried out. The 1980s will bring a higher level of space capabilities and concurrent advances in the hardware and software that make up our robotic space explorers. Sights are set on far goals. Our intelligent spacefaring machines can bring us closer to the solar system neighborhood—and continue to expand human senses far beyond the reach of Earth. □

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STARLOG FUTURE

Have Reserved A Come up with the best idea

We've put money down on a Getaway Special, a bargain-priced (at \$10,000) passage for an experimental package into space and back—aboard the space shuttle.

And we're giving it away—to the person (or people) who come(s) up with the most interesting proposal for what to do with it.

What pet theory, bright idea or burning question would you like to test in space? Here's your chance for a free ride on the space shuttle to the ideal laboratory for testing out ingenious ideas about what can be done in the unique environment of space.

Make an amazing breakthrough discovery—the patent's yours! We'll pay the bill for your experiment's trip into space.

The Getaway Special is NASA's way of demonstrating how the space shuttle, with its cost-cutting features, will make doing things in space an afford-

able reality for many more people. In the 1980s, shuttles will be blasting off on regular flights to orbit. On nearly every flight, one or more Getaway Specials will be stashed in the shuttle cargo bay—space available, roughly first come, first served.

FUTURE/STARLOG's Getaway Special could fly as early as 1982, maybe not until 1984 depending on how flight schedules shape up once the shuttle's in operation.

We want the experiment to be ready in 1982—to take advantage of the earliest possible flight opportunity.

Now—how are you going to take advantage of this once-in-a-lifetime opportunity for a free ride into space?

Turn on your imagination and think about how to take advantage of the unique environment of space to do something really out of this world, something that can't be done on Earth.

Some things about the GETAWAY SPECIAL:

It can weigh up to 200 pounds. It can have a volume of up to 5 cubic feet.

It must fit into a cylindrical container less than 20" in diameter, just over 28" long.

It must not fall apart when subjected to launch vibration or bumpy, high-speed landing.

It must be completely self-contained. That means:

It must have its own power supply (none available from the shuttle).

It must be automated, able to do whatever it will do with the help of 3 on-off signals from the shuttle crew.

It must have its own data-collection system, if it needs to collect data *in space*. (Some experiments might simply require inspection on return to Earth.)

It must be able to withstand temperature extremes from -50° to 200°, or

If it needs to maintain a constant temperature, it must have its own thermal control system. If it's alive (that is, any life form higher than molds, insects

and plants), it must be cared for according to National Science Foundation guidelines on experimental animals.

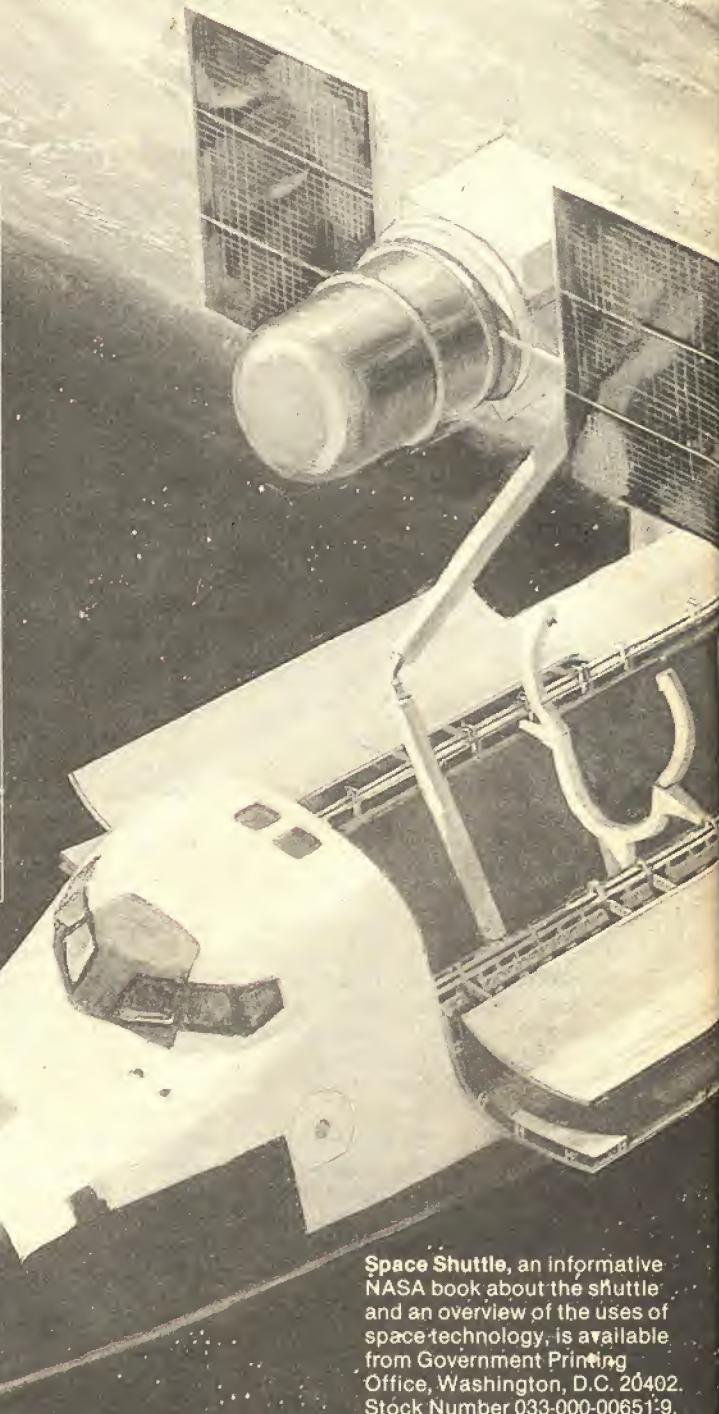
It may have a lid to open to space, or

It may have a vent to admit vacuum; or

It may be perfectly sealed.

It may be in space anywhere from 24 hours to one week.

It will stay in the shuttle cargo bay and be returned to Earth.



How to get started:

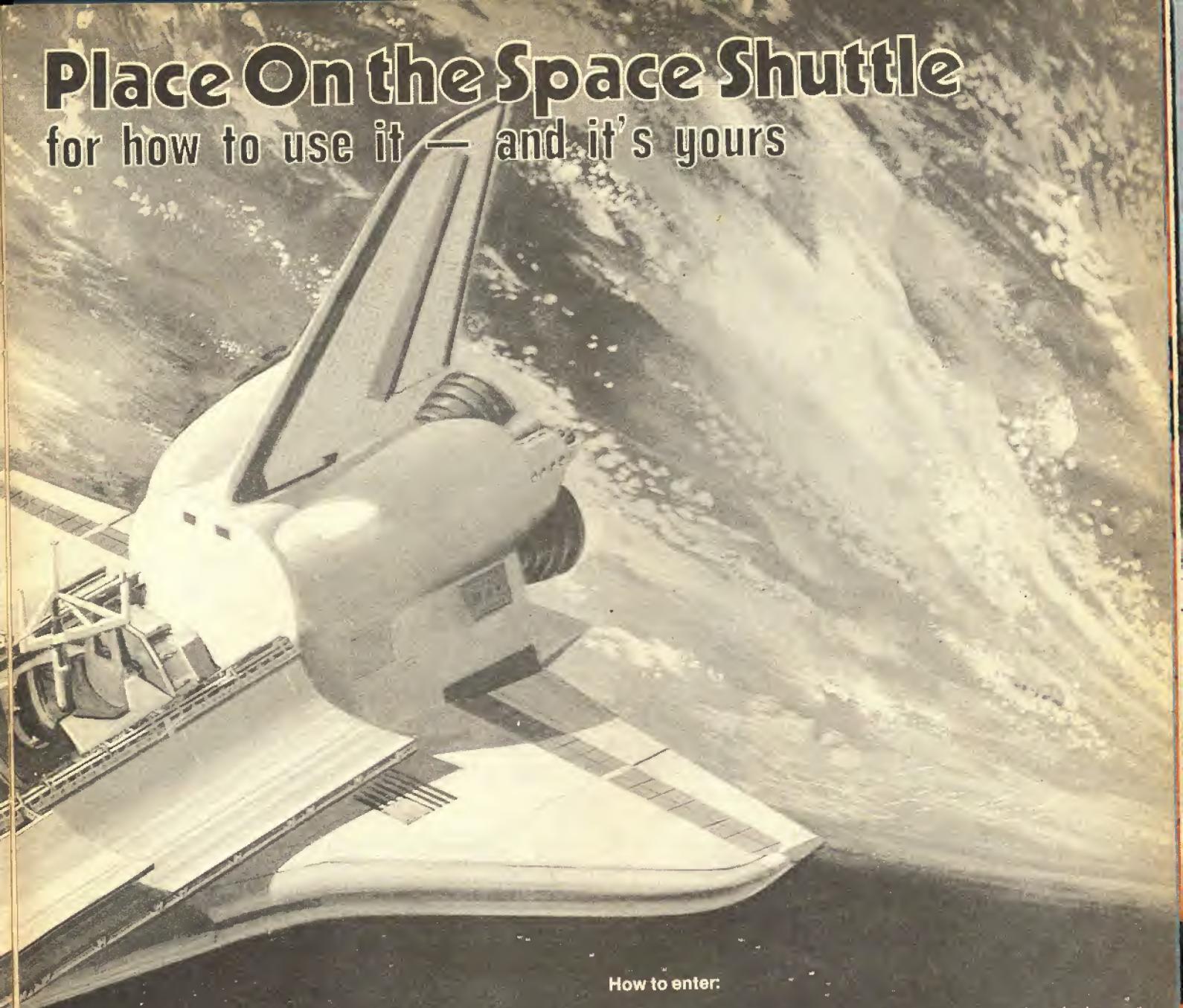
If the opportunity appeals to you, but you a) don't know much about the space shuttle, b) don't know much about what's been done with zero-gravity, vacuum and the space environment before, c) aren't immediately seized with the perfect idea or d) all of the above, here are a few places to look for general information:

Space Shuttle, an informative NASA book about the shuttle and an overview of the uses of space technology, is available from Government Printing Office, Washington, D.C. 20402. Stock Number 033-000-00651-9. Price, \$3.40.

NASA Office of Education, Dr. Fred Tuttle, NASA Headquarters, Washington, D.C. 20546. Ask for a list of NASA and Government publications about what's been learned in space.

Libraries, local scientific institutions, etc. Use your ingenuity, do a little research . . . see what you learn along the way.

Place On the Space Shuttle for how to use it — and it's yours



FUTURE/STARLOG's Getaway Special Advisors

G. Harry Stine, author of *The Third Industrial Revolution* and NASA consultant on space industrialization studies, is an expert on the space shuttle—and on the potential uses of the "natural resources" of space.

Leonard David, program director for the Forum for the Advancement of Students in Science and Technology, has fielded hundreds of requests for information on student experiments on the shuttle.

Jesco von Puttkamer, Senior Staff Scientist in Advanced Programs at NASA Headquarters and regular science

columnist in FUTURE, has been involved in space industrialization studies with NASA for years. His knowledge of space science is well-known to readers of "Science Notebook" in FUTURE.

In addition, several more advisors who are experts in various space-related fields will be selected to assist with final selection of FUTURE vs STARLOG Getaway Special Winner.

Who can enter:

Anybody: students, nuclear physicists, high-energy astronomers, biologists, metallurgists, photographers, artists, gardeners—whatever. You may enter as an individual or as a group. You may enter more than one idea (separate prospectus, please).

How to enter:

Send us a one-page typed prospectus on what you want to do with the Getaway Special. Make it a brief, clear statement of your experiment idea—what you hope to accomplish, test, demonstrate and/or find out in space, and how you plan to do it.

The prospectus must include the following information typed on the back side of the same page:

- 1) Your name (or if it is a group entry, the name of the group plus the name of one person who will serve as contact for the group).
- 2) Address (street, city, state, zip code).
- 3) Phone number.
- 4) Your age (or, for group entries, age range).

Mail your prospectus to:
FUTURE/STARLOG-Getaway Special
475 Park Avenue South
New York, N.Y. 10016

Entries must be postmarked no later than July 20, 1979, the tenth anniversary of the first Moon landing.

Prospectuses will be reviewed by FUTURE/STARLOG's panel of Getaway Special Advisors. Before a winner is chosen, a number of contestants may be asked to submit more detailed proposals for final judging.

Getaway Special winner will be announced in December, 1979.

FUTURE/STARLOG can assume no responsibility for material submitted. Keep copies for yourself. We can acknowledge receiving your prospectus only if you enclose a self-addressed, stamped postcard. No material will be returned. Prospectuses longer than the one-page limit will not be considered and will not be returned.

The Brothers Hildebrandt

"We're Gonna Outdo It All"

By BOB WOODS

The Brothers Hildebrandt are a unique artistic team combining to form an intense creative force. Watching them together is an experience. At one moment Greg is wildly displaying a concept from one of their paintings. Vividly describing a battle scene employing ray guns and warring Amazons, Greg's hands swoop to the noises that he adds for verbal illustration. Without warning, Tim cuts in and picks right up on his brother's lines as well as his gestures and enthusiasm. Greg goes silent.

Both have a very serious and professional sense of their work, but they get wide-eyed and sometimes frenzied when conveying ideas. All around them is a constant mixture of laughter, silence, motion, color, seriousness, energy and intensity.

Separately, their individual characters are evident, yet together they could pass as the first successful human clones. And no wonder the likenesses — they've been doing things together for most of their lives. Even from birth, very little has separated the two. In fact, in the past 40 years, not much more than five minutes has kept them apart — Greg is the older of the twin Hildebrandts.

Since their childhood days in Detroit, The Brothers have had a passion for science fiction and creating their images of it. "I grew up on comic books," says Tim, who comes off as more of the spokesman. "We were always drawing comic books."

Their fascination with the genre didn't stop there, though. After reading a comic book or seeing a movie such as *War of the Worlds*, they'd set about making costumes. "We made the green guys out of cardboard, cloth and masking tape," Tim says. "If I had to pinpoint the most exciting time in my life . . ."

Tim reminisces. "I remember when we were in high school, everyone else was going to junior proms and all that stuff. I never went to one in my life. All Greg and I were doing was building a planet set out in the barn. And a flying saucer — a nice, classic, smooth flying saucer. We put a silver dome on the top, and on the bottom we made a conical shape that came down."

With wonder in his eyes, Tim recalls how they proceeded to film (in slow-



PHOTO: © 1978 20TH CENTURY FOX

The 48-hour Star Wars poster. "One of us would sleep while the other painted."

motion, 8 mm) *War of the Worlds* ala Hildebrandt. With hair-thin wires, they suspended the saucer from a pole and then enlisted a 6'7" friend to "fly the thing over the set." Magnesium was used to stage explosions and fiery comets were created by throwing wads of gas-soaked paper at piles of magnesium.

Oddly enough, despite their impeccable reputation as illustrators (work influenced heavily by N. C. Wyeth), the Hildebrands aren't too comfortable with the title of artist. "Greg and I were never hung up on art or painting. We used to get bored to death." Their real desire was to make films. "It was movies, movies — it had to move!" In fact, since they first saw Pinocchio, their Nirvana was no farther than Disney Studios.

The Disney fever was the motivating factor that led them to a year of art school after high school. "We had written to Disney for eight years, getting mimeo letters back telling us to attend a basic art course." After art school, they wrote back, "Look, we took a basic art course. Hire us!"

For fine-tuning purposes they spent a couple of months taking illustration classes, where they found themselves

"drawing cars . . . In Detroit, what else is there to do? Airbrushed bumpers," Greg laughs.

The compulsion for making pictures move landed them a job at Jam Handy's, then nearly the biggest animation house in the Motor City. The job didn't prove to be terribly exciting. "Commercial stuff," Tim says. "TV ads, government film, historical semi-animation things." Like the job they did for the Campbell Soup Co. — "The History of Soup."

Yet there were assignments that were more rewarding than others. "We made a fireball one time . . . we helped to design sets and stop-motion jobs. It was a lousy TV commercial, but we were animating the puppets on the set, so we got a lot of experience."

After moving to New Jersey, The Brothers' next shift of gears found them making documentary films for the Catholic Church. Bishop Fulton Sheen had seen their work and enlisted their talents to produce PR for the Lord, sending them all over the world to shoot footage. One of the assignments called for a movie dealing with Vietnam. They added some of their personal opposition to the war, but their employers didn't share their views. Thus ended another chapter.

"I don't know how we got into making documentaries, but we did," Tim says. "Somewhere in the middle of it we said, 'All we are is a couple of newsreel photographers . . . everybody's doing this. What are we?'"

It didn't take much soul-searching for the brothers to decide "that we were artists," and the logical next step was to actively "get into it again."

"We put together our portfolio and went to a publisher," Tim recalls. The firm was Western Publishing Co. in New York, and the job was to illustrate children's books — including a couple of scratch 'n' sniff titles. "Giving all the kids cancer of the nose," Greg says with a mad, mock chuckle.

Not unlike their past duties, though, the world of kid-lit didn't go exactly as they would have liked it to. "It was some fantasy stuff to begin with," Tim says. "Then, all of a sudden it went into text books . . . really the bottom of the barrel in illustration." They were struck with the age-old question: "Oh my God, what did

"A Very, Very Close Encounter," (1973) by Greg Hildebrandt. "I was flipped out because of all the garbage illustrating we were doing. . . . I felt a lot better when this was done." Following spread: "The Siege of Minas Tirith." from the 1978 Rings calendar.



GREG
HILDEBRAND



ART: COURTESY THE BROTHERS HILDEBRANDT



ART: COURTESY THE BROTHERS HILDEBRANDT



PHOTOS: COURTESY THE BROTHERS HILDEBRANDT



Far left and below: two SF book covers in the wake of the success of the *Rings* calendars. Left: two rare clips from *War of the Worlds* ala Hildebrandt, filmed while they were in high school. The top clip surveys their planet creation. The other clip shows the alien attack. Note the ingenious "death ray" coming from the saucer. This was cleverly mastered by simply scratching a pin across the film.



"When we were in high school, everyone else was going to junior proms and all that stuff. All Greg and I were doing was building a planet set out in the barn. And a nice, classic, smooth flying saucer."

we get ourselves into?"

Whatever it was, they didn't like it. "Right around that time," Tim says, "we read *The Lord of the Rings* and we said, 'We gotta illustrate it!'" It turned into one of those rare moments when everything seems to come together. "We had gotten ourselves off the track; years had gone by. *The Rings* was ... my God ... like this was it!"

It was 1974 and good fortune followed them, finding its way under Tim's Christmas tree. His wife, Rita, gave him a copy of the new *The Lord of the Rings* calendar, illustrated by Tim Kirk — the perfect gift, as it turned out. A few days later, Rita asked her husband if he had read the back of the calendar: "Any artist wanting to illustrate *The Lord of the Rings*, please contact Ballantine Books."

"The day after that we happened to be in New York with our portfolio. We went to see Ian Summers (at Ballantine)." But the manner in which they did typifies the combination of craziness and creativity that has come to be their trademark.

It was raining that day and they had to utilize some household means of keeping their paintings dry. When these two bearded guys from New Jersey came dripping into the posh, carpeted offices of Ballantine Books carrying large green garbage bags over their shoulders, no one was ready for the incredibly talented work that filled their makeshift portfolios.

Summers liked what he saw and gave them their first assignment — on speculation, of course. "As soon as we came back with that and showed it to them, we did the calendars." For the next three years, 1975-78, Ballantine's popular *Rings* calendars were lovingly illustrated by The Brothers Hildebrandt; the fourth turned out to be the biggest selling in calendar history.

The popularity and professional recognition of the Hildebrandts was now firmly established. Best of all, they were spending 18 hours a day immersed in the kinds of projects they had always hoped for. They felt the same kind of joy they had experienced back in their parents' garage in Detroit — building the models and drawing the comic books — realizing their childhood fantasies.

In addition to the calendars, Ballantine also commissioned The Brothers to do a series of science-fiction book covers, as did Ace and other publishers. And then came the *Star Wars* poster. George Lucas and company had commissioned several renderings of what he thought might be the "right" poster for his new adventure

movie. It was nine days prior to the film's premiere when The Brothers received a panic call from a New York agency. "We need a poster overnight, literally. Can you come and help us out? It's a fantasy film about space."

That was all they told them; they had no idea what *Star Wars* was all about. Nonetheless, it was largely their devotion to the field that found them rushing into New York. The studio gave them a pile of black-and-white photos for reference and one question: "Can you have it in two days?"

Tim relates the ensuing 48 hours. "We hustled ourselves back to New Jersey and immediately started drawing a layout. We got the layout drawn in a couple of hours, transferred it to a piece of masonite and started painting instantly. It was one of those deals where one of us would go to sleep while the other guy painted, then the other guy would take over, and we'd keep it going for 48 hours till it was done. We were under the impression that we were just doing a movie poster (though the poster never made it to the movies). About three days later we saw it on everybody's t-shirts and in every window in New York City."

The Hildebrandts have accomplished much in a short time, including respect and credibility in the burgeoning field of science-fiction/fantasy art. Many an artist would be satisfied with their present reputation, but it is not enough for The Brothers. They still have some longtime, personal dreams to chase after.

When the contract for the fourth Ballantine calendar came along, "We sat on it for a couple of months because we were in the middle of developing our own story," Tim says. The Brothers had already concluded that they wanted to do something original. Initially, they'd thought about doing a Hildebrandt calendar, but once they sat down to figure out the theme, they decided to expand the idea into book form — *Urshurak*. And their concept continued to expand, until they said, "The hell with (just) the story; let's come up with a movie." For the past year and a half, little has deterred them from the two projects.

"It was a crucial decision to make. We hadn't sold our story yet and there was the calendar waiting for us to do." Tim shrugs, "You gotta make a living."

Their doubts persisted. "We didn't want to make a career out of doing *The Rings*," Greg says. "We had covered it. By the third (calendar), we were bored with it. How many times can you do

somebody else's story. It was this whole thing of, 'Let's do our own story. It's got to be much more exciting to invent the whole thing.'"

Thereby ended the Hildebrandts' *Rings* calendars and began *Urshurak* — the book and the movie. They describe it as "a jump off the deep end," but the prevailing attitude was, "Man, *Let's do it*. We had a lot of conviction. We were gonna do it!"

But Ballantine didn't share The Brothers' enthusiasm for their pet project and hasn't called on them for any work since. "I think it has a lot to do with everybody feeling that *they* discovered you," Greg retorts. "They get into this whole trip that you are indebted to them; indentured slaves or something."

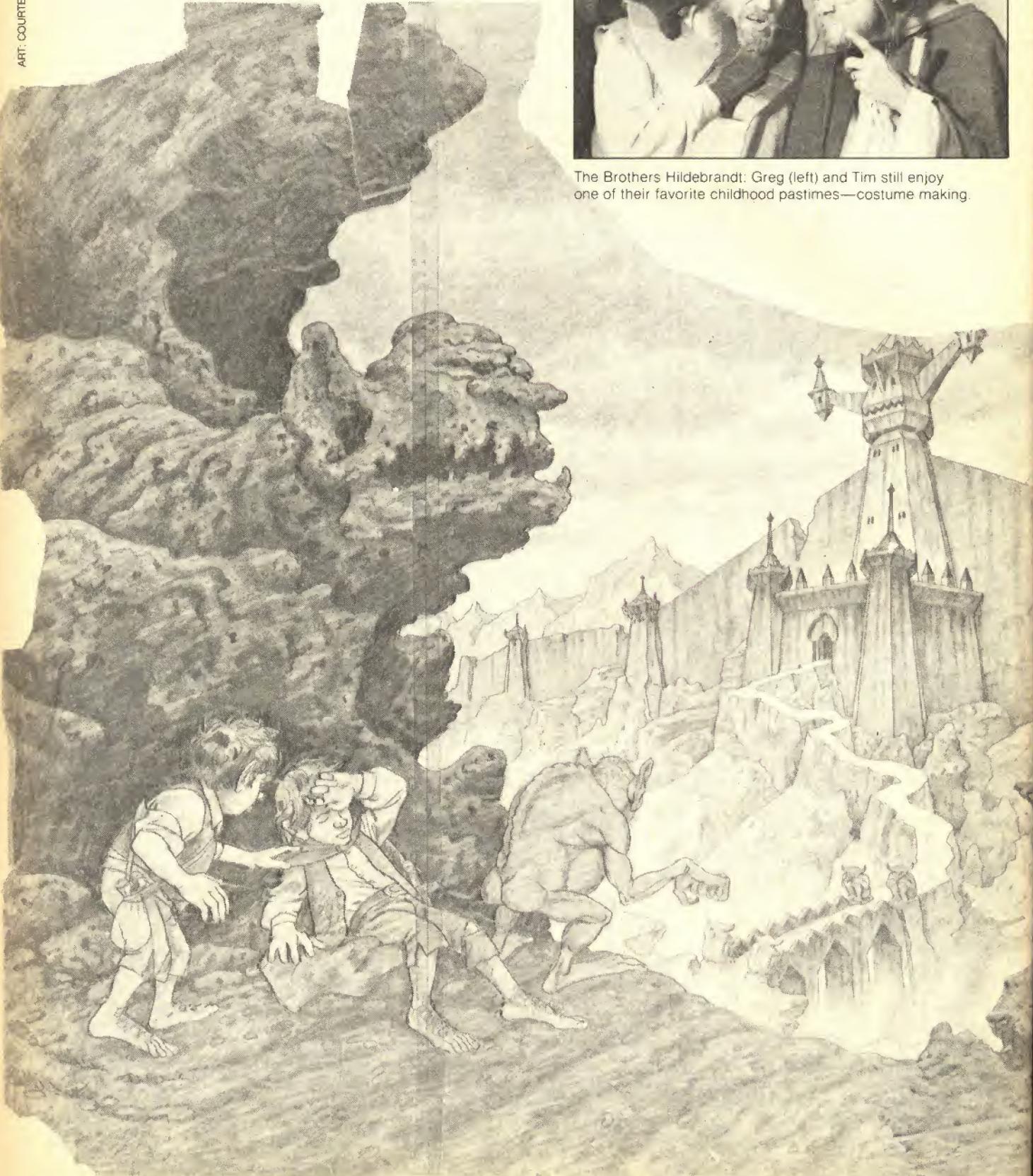
The *Star Wars* poster came and went. According to Tim, the famed painting is hanging in the 20th Century-Fox office of Alan Ladd, Jr. More recently, they spent four months putting together an unusual TV commercial introducing the 3M Corporation's new logo. The assignment turned into another opportunity to revert back to childhood funtime. Along with Gene Leroy, a retired modelmaker who had once worked for Disney, The Brothers designed a spectacular set to creatively illustrate, in three dimensions, 3M's "corporate image." ("SF Graphics" will report on this in FUTURE #9.)

Urshurak had rather humble beginnings. It took nearly a month of "walking in circles and taking notes" to pin down the storyline. Yet with only six pages of the draft completed, they rushed over to their musician friend Bill's house to see if he wanted to score the movie. Bill, who was busy knocking down a wall when they dropped by, recalls the incident. "They arrived ... with a half-cooked turkey, half a bottle of wine and six pages. 'Bill, you want to do some music for some big fancy movie?' 'Well, I'm knockin' down this wall right now . . .' " Greg adds, "Then *Urshurak* got going. Bye-bye everything else. It was really complete and total involvement."

What's *Urshurak* all about? As it goes in the world of advance publicity, little can be revealed at this time. The book is slated to be a major release from Bantam and is scheduled to be in the book stores by spring of next year.

Suffice it to say that *Urshurak* will be a Tolkien-esque fantasy novel complete with a Messianic elf prince, mystical wizards, an evil power and a rallying of the good guys against the bad guys. The book is being written by a longtime friend from Detroit, Jerry Nichols, and exquisitely illustrated

Below, far right: two preliminary sketches for *The Lord of the Rings* calendars. Until recently, The Brothers drew very detailed sketches, some which took several months to execute. When this proved to be too time-consuming, they began doing very basic preliminary work and concentrating more on the painting itself. Their painting style is to work from the background and paint forward.



The Brothers Hildebrandt: Greg (left) and Tim still enjoy one of their favorite childhood pastimes—costume making.

The Hildebrandts are now fully committed to "Urshurak," their original book and movie.

"Our movie is going to be a masterpiece!"



by Greg and Tim. The oversized paperback will include 18 full-page color plates in addition to numerous black-and-white drawings.

It would be too easy to link *Urshurak's* plotline with the Hildebrandts' close association to Tolkien's works, and the criticism is sure to arise from *Rings* purists. "We were into it long before *The Rings*," Tim says matter-of-factly. "We don't consider ourselves *Lord of the Rings* fans; we consider ourselves fantasy fans." However, they are quick to give Tolkien his due credit. "Tolkien had gotten it all together, though the only creation was the hobbit."

This led to the question of why the Hildebrandts agreed to illustrate Terry Brooks' *Sword of Shannara*, a fantasy epic that's come under fire for its obvious Tolkien similarities. "We were signed to a contract," Tim says simply. "I started to read it — I was saddled with it — and every 25 pages or so I'd say, 'Augh, come on!' I realized it was a rip-off and I said, 'OK, I'll read it on that level.' I'd say 75 percent of it (was a rip-off). It's obvious the guy was a fan — it went to his head. We were conscious of our similarities and we tried to stay away from it, but it couldn't be helped. I mean, what does a White Wizard look like?"

With the book project now completed, the brothers are busy working on *Urshurak's* look for the wide screen, although they're still not sure that Hollywood can capture the unique creations set forth in the novel. Citing the special effects wonders of recent films, Greg says "The moguls are becoming educated and the people want to see it. The special-effects people — like Trumball and Dykstra — have raised it to an art. People respect them and the moguls listen. Now the true stars are coming out; now they're becoming recognized."

But Tim says that the "look" they're after can't be compared to anything that's been done so far. "I want to see it because it's never been done. We're gonna outdo it

all . . . outdo them in an effects look!" So now the push is on to find the Hollywood people with all the machinery to pull it off. Greg laughs at the apparent paradox. "It's a nice balance . . . some of the most complex mechanical devices to tell a sort of anti-technical tale."

The discussion of technology carries Tim back to his first love. "I've never had anything against the science-fiction aspects of technology — rockets, flying saucers, space travel. We never looked at it as science fiction. I remember after seeing *Destination Moon*, we used to go around the family talking about weightlessness. Aunt Gurdie looked at us like we were nuts. 'You've been watching too many *Flash Gordon* movies.' "

Greg and Tim easily admit that even if they do find the right effects people, they might still run into stumbling blocks once they get to Hollywood. But they're adamant about striving for the look they have in mind. Says Tim: "Our movie is going to be a masterpiece. If it's not, I don't want anything to do with it. As long as everybody's together in holding their ground, we'll be able to maintain it. We've already made up our minds. If it gets down to, 'We'll get a guy to do this and a guy to do that and you guys are out,' we don't want a goddamn thing to do with it. We realize we're going to be dealing with many people — directors, script writers — and obviously there are going to be all kinds of concessions. We are aware of that. Nobody's going to give you \$20 million and say, 'Here, go make your movie.' "

Back at Greg's studio in New Jersey, The Brothers Hildebrandt are diligently toiling to whip the masterpiece into shape. For the time being, they consider themselves "out of illustration." As far as they're concerned, they've done that and now it's time to move on and fulfill a few more of those childhood fantasies. □

"The Brothers Hildebrandt: A Book About the Artists." has been published by John Taylor. For details, see page 18.

PART II

Operation Morning Star: The Unveiling of Venus

Last issue's investigation of space was aboard the Pioneer-Venus probes. Part I left us hovering over the Venusian landscape — a scorching, dull-red dust bowl. The historic journey continues . . .

Ves, peeking under the veils of Goddess Venus is a job of considerable magnitude and difficulty. The planet's clouds are no ordinary clouds. Fast-moving, pale-yellow in color, they surround the planet unbroken in a distinct 18-mile-thick layer at altitudes between 30 and 50 miles. Unlike the white clouds on Earth, they cannot consist of water droplets in an atmosphere made up of 97% carbon dioxide, some nitrogen and only traces of water vapor. The mystery remained unsolved until 1973, when Andrew T. Young of Texas A&M University found that the properties of concentrated sulfuric acid fitted in with the observed polarimetric characteristics. Today we know from data obtained by James B. Pollack and others in NASA-Ames' high-flying C-141 Kuiper Airborne Observatory that sulfuric acid comprises more than five-sixths, 84%, of the clouds. According to Young, there may also be some elemental sulfur. With that much acid, an effective drying agent, there must be even less water in suspension than previously assumed.

Yet, we understand little of the structure of these clouds. Seen in ultraviolet light, they show dark markings of characteristic form, and it is these marks that reveal the rapid motion of the clouds. Zipping across Venus' face at about 225 miles per hour, some fifty times faster than the planet's own slow rotation, they travel around Venus in four days. The high winds that push them play an important role in the weather on Venus: they are part of a huge atmospheric engine that shuttles energy from the planet's equator toward its poles.

Above the clouds, there are tenuous layers of haze. Below, the "air" is clear, but hot and thick. At "sea level," its pressure is ninety times higher than on Earth, and its density would make it very difficult to move around.

Penetrating such an inferno of an atmosphere for a soft landing on the invisible surface calls for a special strategy, executed first by the Russian Venera probes: a slow descent, on parachutes, through the

mysterious cloud layer, to gather scientific data, and a subsequent fast plunge, without chutes, through the bulk of the hot and dense atmosphere below, in order to protect the lander from overheating.

The last two USSR spacecraft, Venera 9 and Venera 10, each weighing over 700 lbs, touched down on October 22 and 25, 1975, respectively. Two days prior to their searing entry into planetary atmosphere, the automatic devices had separated from their "buses." These spacecraft became Venus orbiters, serving as communications relay stations between their landers and Earth. After impact, at a crushing 15 miles per

on the ground have been found to be very low — around one to two miles per hour — and, consequently, there is little dust in the Venus atmosphere. Thus, wind erosion does not seem to be involved here. Instead, the high temperatures may cause chemical interactions of the rocks and the atmosphere — corrosive reactions which would release substances into the "air" that on Earth would be bound in the rocks, such as chlorine and fluorine, resulting in hydrochloric and hydrofluoric acid. Such surface processes would explain the presence of the sulfuric acid clouds at 30 to 50 miles above the surface.

All in all, the results from past Mariner and Venera missions have increased our knowledge about the planet, but they have at the same time opened a tangle of new questions and deepened the mystery.

With Venus so much like Earth in mass, diameter, density and distance from the Sun, why has it developed so extremely differently from Earth? Why is its surface so much hotter, its atmosphere so much denser and its rotation so much slower than that of Earth?

Water exists on Earth so abundantly that more of its surface is covered by oceans than by dry land. Even Mars, as the Viking pictures have shown, had undoubtedly enough wetness in its long-ago past to carve out river meanders, stream beds, canyons and deltas. Were there oceans on Venus before the surface got too hot to retain liquid water? And if so, where did they go?

If they evaporated, the Venus atmosphere should be more than twice as massive as it is, carrying water vapor of 150 atm pressure in addition to its 100 atm of mostly carbon dioxide. And where is all the oxygen which would have been broken out of the water molecules by solar ultraviolet radiation? Did it enter into new chemical unions with surface rocks, or with sulfur to form the sulfuric acid droplets clouding the planet's hellish atmosphere?

Why does Venus, under its maidenly



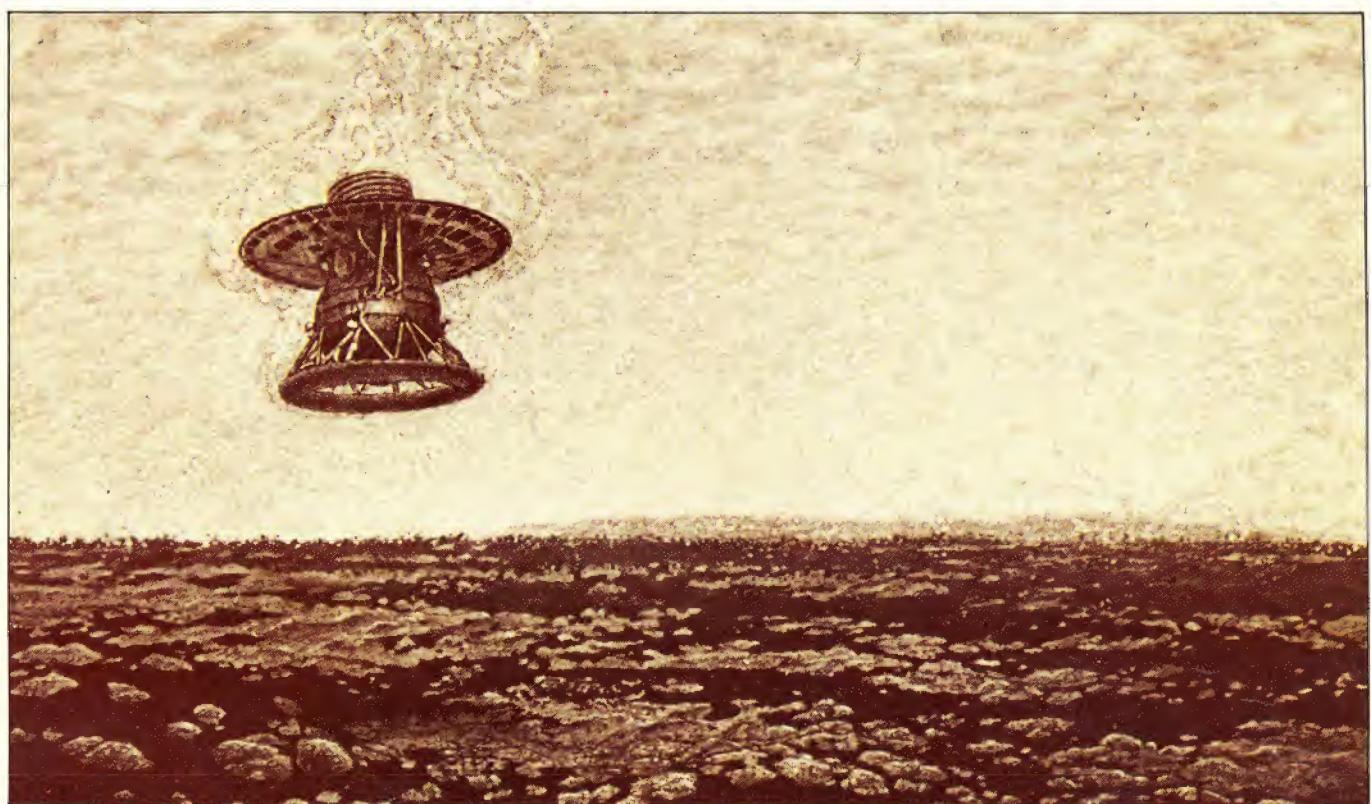
PHOTO: NASA

hour, both landers remained within radio view of their orbiters just long enough to transmit one panorama picture each across 40 million miles to Earth, plus scientific data of the Venusian environment.

The pictures, taken about 1250 miles apart, showed two very dissimilar regions of the planet's surface. Venera 9 had landed on a steep slope of a hill covered with stones, typically a foot or more in size, with rather sharp edges. Obviously, they have not yet been affected noticeably by surface erosion, indicating the geological age of the landing region to be relatively "young."

In odd contrast, the Venera 10 panorama showed a rather smooth plain or plateau with flat stony patches which appear to be exposed bedrock, but no stones. This suggests an age older than the other landing site, but it also poses the puzzle of how the layered rock had been exposed in the first place and how the edges of the visible outcrops had been sanded down over the ages. Liquid water cannot exist on the planet's hot surface. Wind velocities

Jesco von Puttkamer is Program manager of Space Industrialization and Integrated Long Range Planning Studies at NASA. He is also the technical advisor for Paramount's forthcoming Star Trek movie.



The Russian unmanned Venera 10 settles through the dense Venusian atmosphere (equal to 92 Earth atmospheres). A surface temperature of 465° C. was monitored with a slight breeze of 15 feet per second. No evidence of the "fishbowl" distortion was detected.

veils, rotate so majestically slowly — once every 243 Earth days (compared to Earth's once-per-day spin)? Curiously, a day on Venus is longer than a Venusian year (225 Earth days), and its solar day — from sunrise to sunrise — is about 117 Earth days, resulting in two sunrises and sunsets every rotational (sidereal) day. Next: why does it rotate in the "wrong" direction, retrograde, opposite to its annual revolution about the Sun and to the spin of the rest of the planets? Did a former satellite of Venus once crash into the planet, changing its rotational characteristics? This theory, postulated long ago, has still not been confirmed or refuted. And why does Venus always present the same face toward Earth at each closest approach, i.e., when it passes between Sun and Earth? Is there a gravitational linkage between the two planets — or is it only coincidence?

Why has Venus no magnetic field to speak of? Unlike Earth, its atmosphere thus has no protection from the bombardment of high-energy particles — protons and electrons — known as the Solar Wind.

Venus knows not spring, summer, autumn or winter. Seasonal effects, if any, are minimal because the planet's polar axis is almost perfectly perpendicular to its or-

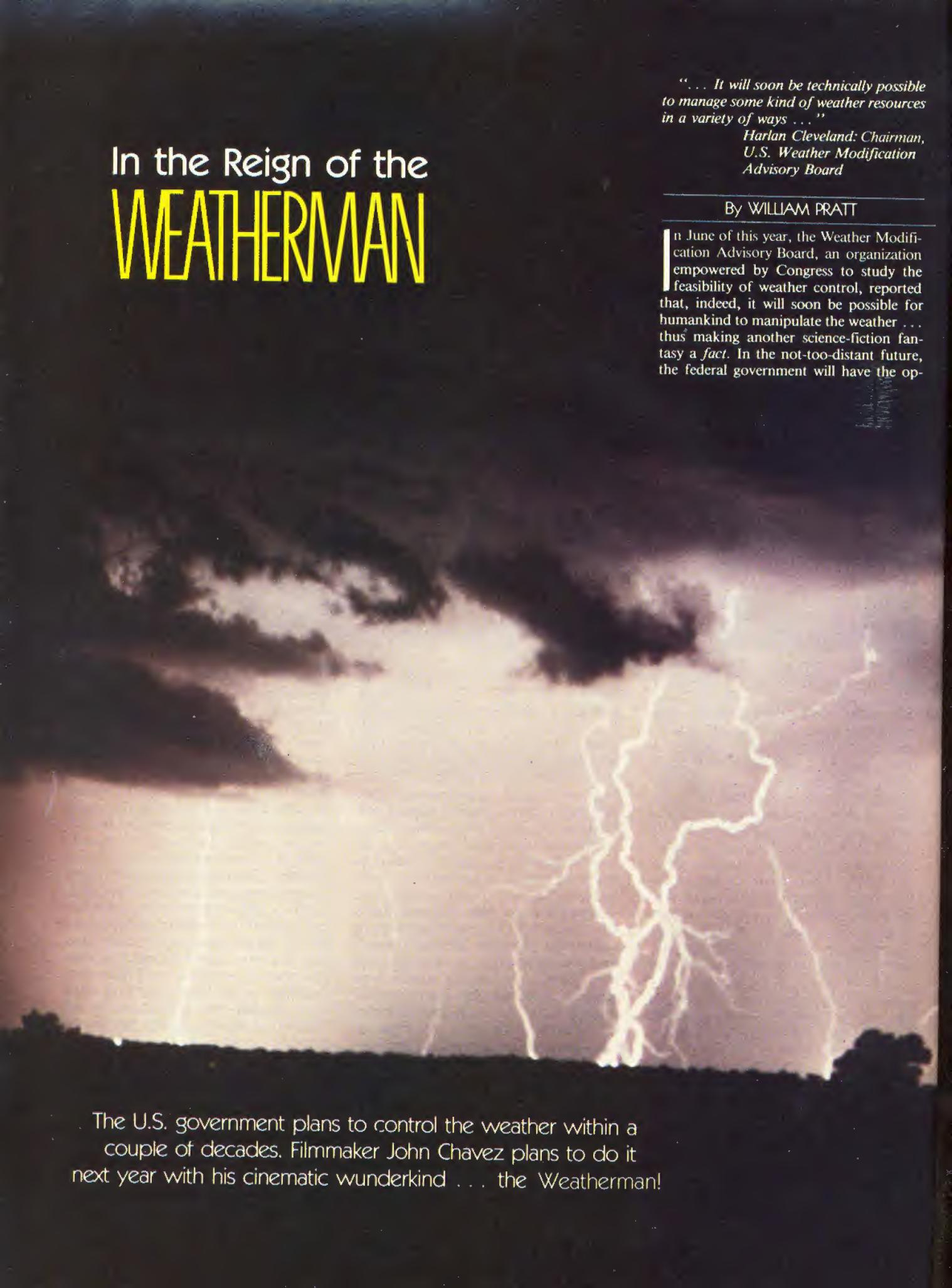
bital plane, compared to Earth's generous season-producing tilt of 23.5 degrees. Circulation processes in its atmosphere, as a consequence, are far simpler and much more uniform than on Earth. In addition, with the planet's permanent cloud layers, there is no change between overcast and sunshine. Also, there are no oceans whose interactions with land masses and atmosphere play such a big role in the formation of weather and climate conditions on Earth.

Beyond that, the slow rotation of Venus does not cause the Coriolis effect which, in conjunction with solar heating, "drives" the terrestrial weather. As a result of all these factors, the weather machine on Venus is quite simple, with almost identical conditions on northern and southern hemispheres. Venus, thus, becomes an ideal laboratory for the likes of meteorologists, climatologists, planetologists and geologists, to conduct controlled experiments similar to those in Earth laboratories where certain parameters are held constant, in order to study other variables.

While the interest of U.S. scientists in the exploration of the mysterious Venus atmosphere was undoubtedly sharpened by the Soviet Venera discoveries, the

American Venus program differs fundamentally from the Soviet Venus missions. It is obvious that the latter place their emphasis on the exploration of the Cytherean surface at specific, circumscribed locations. In contrast, NASA's research program is pursuing a more total planetary strategy. It primarily intends to help answer certain fundamental scientific questions concerned with the cause of planetary phenomena and is developed around these questions. Thus, we must see NASA's Pioneer-Venus project only as a sub-program in a master plan that embraces the exploration of both the inner and the outer planets in search of more universal answers. The main distinction between the two Venus programs, which — to be sure — are coordinated through mutual exchange of scientific data, are the scientific objectives themselves. The quest of NASA's planetary exploration missions is for the origins of the solar system as a whole and their relationships to Earth.

Yes, science is keeping its fingers crossed as Pioneer-Venus 1 and 2 prepare to help unveil the mysterious Mistress of the Heavens. There is a lot riding on these missions for all of us — not just the scientists. Their findings could be significant, even crucial to the preservation of our environment.



"... It will soon be technically possible to manage some kind of weather resources in a variety of ways..."

Harlan Cleveland: Chairman,
U.S. Weather Modification
Advisory Board

In the Reign of the **WEATHERMAN**

By WILLIAM PRATT

In June of this year, the Weather Modification Advisory Board, an organization empowered by Congress to study the feasibility of weather control, reported that, indeed, it will soon be possible for humankind to manipulate the weather... thus making another science-fiction fantasy a *fact*. In the not-too-distant future, the federal government will have the op-

The U.S. government plans to control the weather within a couple of decades. Filmmaker John Chavez plans to do it next year with his cinematic wunderkind... the Weatherman!

portunity to work a myriad of meteorological miracles: creating storms by towing electrical wires through clouds; suppressing lightning by distributing inhibiting fibers beneath thunderstorms; dispersing fog and pollution through the use of solar reflectors; changing the track of rain showers through heat application and increasing rainfall by bringing up the temperature of the ground below.

Science-fiction film fans who don't particularly feel like waiting a decade or so to see these wonders occur need only to bide their time until 1980 when *Weatherman* hits the screen. *Weatherman*: a \$12 million, independently financed excursion into SF futurism created and produced by John Chavez, a 26-year-old college

graduate with degrees in philosophy and communications who has dedicated over five years to the mind-boggling project. Chavez, a movie addict since childhood, is admittedly awed that his very first screenplay is being accorded a multi-million dollar treatment and being talked about some two years prior to completion. "I tried to get studios interested in this for a long time," he marvels. "No one was interested. Nobody was willing to gamble on it. This was prior to *Star Wars* and no one knew whether science fiction was going to be a trend at the time."

Starting off on his own, Chavez was soon joined by Executive Producers Lyn Thompson and Paul Sutherland in the task of getting *Weatherman* off the

ground. Today, pre-production is in full swing with space artist Bob McCall offering design concepts and Joe (*Jaws II*) Alves directing. In Hollywood SF circles, everyone is talking about *Weatherman* — about it being the first filmed look at climate control. But, oddly enough, no one knows what the movie is about.

Much to his dismay, Chavez finds that he *has* to surround his brainchild in a shroud of secrecy. Seated with Lyn Thompson in an L.A. office, he explains his plight. "I'm petrified of being ripped off by other movies," he grimaces. "Or TV! I mean, we've already inspired a lot of people just by announcing the title! I

(Continued on page 74)



PHOTO: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



New astronaut Dr. Rhea Seddon during water survival training: her career as a surgeon helped land her a job on the space shuttle.

EXTRATERRESTRIAL EMPLOYMENT TIPS

The Key to Planning a Space Career

THINK SPACE

"How do I plan for a career in space?" pops up more and more frequently in letters from readers of *FUTURE*, and our sister magazine, *STARLOG*. We took that question to Carol Rosin, former teacher and former aerospace executive, now an Evolutionary Agent and consultant specializing in space and future education. During her tenure at Fairchild Industries, Rosin worked closely with the late Wernher von Braun in a program to communicate space benefits and goals to the public.

By CAROL ROSIN

Solar power satellites, orbital factories, lunar mining and research bases, orbital colonies, solar system explorers . . . just a few of the futuristic-sounding space goals which look feasible within the next few decades. If the proponents of the High Frontier are right, classified ads at the turn of the century will list jobs for space welders and construction workers, space farmers, space dieticians,

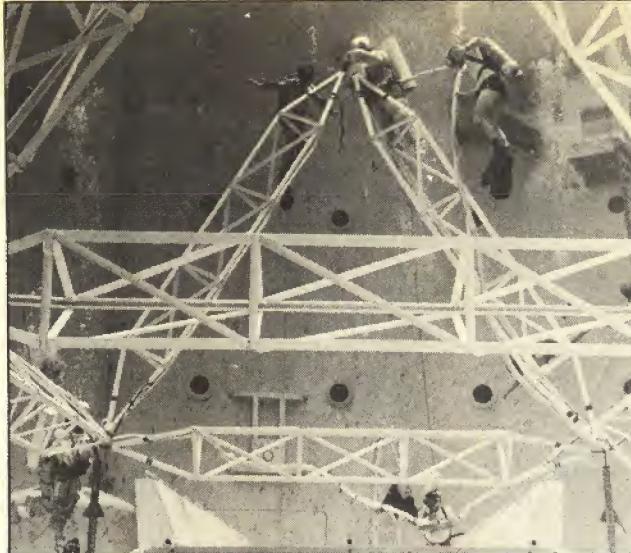
space lawyers, space teachers . . . in fact, the whole spectrum of conventional occupations needed to support human existence. And there will undoubtedly be entirely new careers to follow, jobs we haven't even imagined yet!

The variety of careers related to the planning and development of new technologies and life sciences leading to our future in space promise to be as unlimited as space itself.

How does a person who is eager to participate in the space effort get involved now, in 1978? Stated simply, your opportunities for a career in aerospace are enhanced by your ability to "Think Space." Apply your experience, skills and interests to carve out your own niche in the space program. There is plenty of room for creative thinking.

Space technology has already provided humanity with hundreds of spin-off benefits, from microelectronics and medical advances to agricultural monitoring and a global communications network. By tuning in to existing problems that could be solved by some aspect of space technology—such as population growth, food shortages, dwindling oil and coal resources, air and water pollution, environmental destruction and so on—you may be able to locate (or create) an interesting and valuable space career.

The space job market holds great potential for anyone capable of "thinking



Space careers begin on Earth: analyzing data from Landsat satellites (far left); underwater testing of methods for building in space, to simulate zero-gravity (left); setting up a metal processing experiment for sounding rockets; (below left); developing the instruments for ocean monitoring by satellite (below), at NASA centers across the country. Moving off the planet will require many talented people in a variety of disciplines.



space." The key is to apply your special talents, learned skills and education to the growing arena of space-related careers. Plenty of opportunities will be available—and not all of them will be listed in the usual occupational handbook.

"Astronaut" is the most obvious space career, but there are still far more applicants than jobs for astronauts. This year 35 new astronauts were selected to supplement NASA's existing corps on space shuttle flights. More than 8,000 people applied. Of the 35 selected, not one of them took a course in Astronaut 101. Obviously, they are all super "space thinkers" who know how to apply their skills to exciting opportunities.

One new mission specialist astronaut, Dr. Rhea Seddon, admits she thought her chances for becoming an astronaut were "far-fetched." But armed with the knowledge that a science career was a prerequisite for the job, she established herself in a career as a surgeon. She also earned her private pilot's license. "If there was something I could do to improve my odds, I did it," Dr. Seddon recalls.

Her advice to aspiring young astronauts?

"Develop your science background and

plan an alternative career because this one is highly competitive. And dare to take a chance! If I hadn't, I wouldn't be here today."

Some career paths of her fellow astronauts—medical researcher, professor of aeronautics, aerospace engineer, physicist, astronomer, test pilot, naval aviator, mechanical engineer, astrophysicist, geologist—suggest the variety of occupations that can lead to space.

Although the astronaut job market is highly competitive, it's encouraging to remember that in Charles Lindbergh's day, becoming a pilot was nearly as difficult. With the stepped-up commercial era in space on the horizon, more people will be going into space to live and work and more astronauts will be needed. Last decade's space effort has already created countless new jobs and career opportunities. New disciplines and career interests have emerged.

Many sciences now look to encompass extraterrestrial life by using the prefix "exo": exopsychology, exoanthropology, exosociology, exophysiology and exobiology.

Careers are also opening for research specialists related to space and physical

sciences. Scientists are broadening their scope in the traditional, Earth-oriented studies of geology and meteorology to include space technology. The construction of space telescopes and large radio antennae in orbit will add new dimensions to optical and radio astronomy.

Space law is another growing area. As space activities become increasingly complex, there will be a need for legal and orderly use of the environment. Space law, a natural extension of international law, will provide new opportunities for tomorrow's law graduate. As well, politicians with long range perspectives are needed to plan policy, to encourage private enterprise development and provide optimum human benefit from space activities.

Those who enter fields of education will have to update their courses to include interdisciplinary, futuristic, space and global perspectives. Some educators are already using satellites to broadcast or receive lessons that could not have been achieved with any other method. Space-related curricula, which help prepare one for the space-age world of work, will stimulate more interest in students who are learning to apply their basic skills to the potentially interesting space market.



NASA scientists check out a gravity probe before a recent launch to test Einstein's space-time warp theory.

As humans gain access to the zero-gravity and vacuum environment of space, new challenges will be presented to industrialists, chemists, physicists, metallurgists and pharmacists. As we extend our stays in orbit, there will be requirements for trained technicians, scientists, medical personnel and even repair crews.

It is already apparent that long-range space habitation will call for workers trained in a broad scope of occupations and disciplines, from architectural engineering and interior design to space farming. In case the liberal arts reader should feel left out, there are promising signs that the traditional areas of space studies (math and science) will be increasingly complimented by the social sciences and humanities. NASA recently provided a grant to a group at Georgetown University to study the human aspects of space utilization.

Aerospace engineers have promising career futures in the space business. A forthcoming report by the American Society for Engineering Education states that "the demand for new engineers is already exceeding the supply." *Aviation Week and Space Technology* reports "a shortage of engineers to design, develop and test the nation's space and aviation programs." Graduating aerospace engineers will be able to choose among four or five job offers this year.

Instant global communication and weather satellites are already providing the beginnings of new fields. Satellites will change job descriptions in many areas, such as where satellites provide information on the status of crops, forests, water management, urban growth patterns, resource availability and information relays. Landsat, with its remote sensing devices performing a multitude of services for this planet, has also provided a multitude of careers.

Solar power satellites and the mining of

Source Guide for Planning a Career in Space

A short letter to any or all of the following addresses, stating that you are interested in receiving any literature available on careers in space, should yield some helpful information:

National Aeronautics and Space Administration
Dr. Paul Gardner, Guidance Officer/FE
Washington, DC 20546

American Institute of Aeronautics and Astronautics
1290 Avenue of the Americas
New York, NY 10019

American Astronautical Society
211 Fitzrandolph Rd.
Princeton, NJ 08540

The American Society for Aerospace Education
821 15th St. N.W.
Washington, DC 20005

The Engineers Council for Professional Development
345 East 47th St.
New York, NY 10007

Forum for the Advancement of Students in Science and Technology
1785 Massachusetts Ave., N.W.
Washington, DC 20036

World Future Society
4916 St. Elmo Ave.
Bethesda, Washington, DC 20014

National Space Institute
1911 Fort Meyer Dr. #408
Arlington, VA 22209



the Moon and asteroids will hopefully provide inexhaustible and clean energy and resources for Earth—and for the building of space industries, habitats and better space transportation and communication systems. The careers suggested by these scenarios are limitless.

Another emerging career is that of "Evolutionary Agent." Evolutionary Agents are already working in a variety of positions throughout the world. You may already be, or may choose to be an Evolutionary Agent for your space career. The Evolutionary Agent supports and initiates efforts toward the application of technology for peace, humanity, and for mental and physical evolution into space. Some active agents hold positions in industry, business, government, education, labor, civic and social organizations. Others are thinkers, writers, artists, musicians or independent Evolutionary Agents working on various pro-future projects.

To plot a career in space, first choose your basic area or areas of interest and get a thorough education. While you are earning your degrees, pay close attention to the

Space scientists prepare an experiment to test the effects of zero-gravity on molten metals. At right of picture—not Robby the Robot, but a manipulator arm which will be used when the vacuum chamber is closed. Metals experiments on Earth will solve the problems of building in space.

evolving nature of space technologies and their relation to your field. You will see new career opportunities as the technology develops.

Keep up with progress by reading space and futuristic journals. Join a local chapter of the American Institute of Aeronautics and Astronautics, the American Astronautical Society, the National Space Institute or some organization that will keep you informed. Build up a solid basis of knowledge in your field—space applications will come in on-the-job training, easily when you have a healthy foundation in your discipline.

When you have completed your degrees, seek employment in an industry, a university or a government organization where space projects are underway—or work in a space spin-off area of your choice.

Plan for a space career by contacting your political representatives and expressing your support for an expanded space program and commercial space industrialization ... so there'll be space for everyone who wants to work there.

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FROM
STARLOG/FUTURE



No. 2

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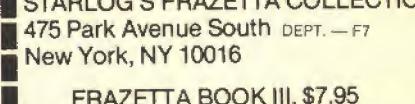
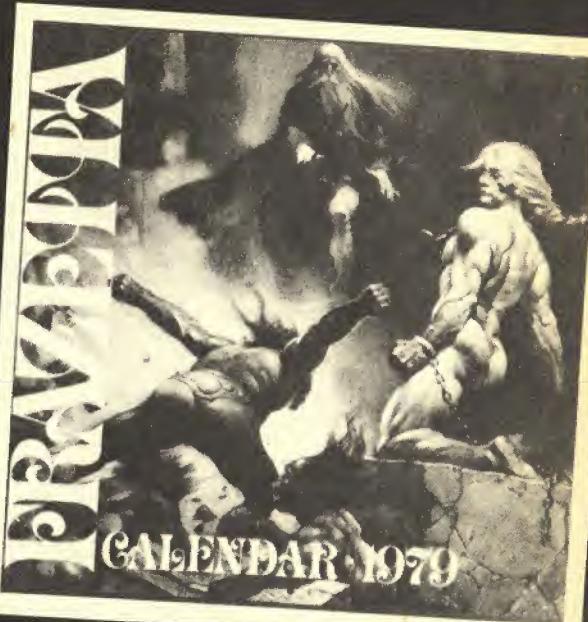
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(Continued from page 24)

TV writer. Some time ago, for example, Gene Roddenberry showed his two *Star Trek* TV pilots at a dinner of the Science Fiction Writers of America in Los Angeles. He suggested that we have our agents get in touch with his office as soon as we had a story outline to 'tell.' If the idea and its development were acceptable, we'd be assigned to do a written outline. When I first went in to 'tell' my story, it was so vague that Gene asked me for additional development. About ten days later, he assigned me to write an outline, which I did. It was subsequently rejected by an NBC overseer in New York.

"Basically, what I'm trying to say is that I have no system for writing outlines. I work my stories out as I go along. Actually, being a *square*, I'm lucky to be a writer at all. Recently, Roger Corman, head of New World Pictures, arbitrarily assigned me to write a screenplay. It took me about six painful months, with kindly assistance from several of his aides. The hardest part of the project, from my point of view, was coming up with an outline. Fortunately they were extremely patient with me and my script, *Computerworld*, was eventually accepted."

At this point in his prestigious career, A. E. Van Vogt is an acknowledged master of systematic creation. There is no limit to his output. During the past decade, for instance, he has revamped his writing habits to allow for the simultaneous creation of six science-fiction novels, working from 11 a.m. to 11 p.m. His *Computerworld* script is on the drawing board at New World, just waiting for the author to complete a companion novelization. And, in Italy, director Luigi (*Stella Star*) Cozzi has optioned Van Vogt's *House That Stood Still*.

Yet, despite his success, Van Vogt still doggedly yearns to crack new systems, develop new insights, new patterns of behavior. "As I've said," explaining his continuous cerebration, "I'm strictly a systems person. I've only gradually extended myself into the world, primarily as a result of adding new thought systems to my repertoire. If I don't have a system for something, I will remind myself of that fact and keep looking at the blank area in amazement. I'm doing that now with TV and film. One of these days an insight will flash at me and I'll have the problem solved. I'm very lucky that I'm patient about all this. I can spend years looking at something until I feel I get it right."

Van Vogt smiles at the thought of his ongoing tenacity. "On all the subjects I don't have systems for, all I can tell people is . . . 'Gee, I don't have a system to explain that. All I can do is speak freely and give you an opinion.'"

And in most literary circles, A. E. Van Vogt's opinion is not something to be taken lightly.

"Weatherman"

(Continued from page 69)

predict that this season Barnaby Jones is going to be chasing someone who's kidnapping clouds!"

Despite the hush-hush status of the project, however, Chavez doesn't mind chatting about its origins. "Over five years ago I started working on an idea about controlling the weather. I was sitting in Linwood Dunn's office when the idea hit me. Linwood is one of the deans of special effects in Hollywood. At the time, 20th (Century-Fox) was making *The Poseidon Adventure* and Linwood saw a return to the big-budget disaster film motif. I happened to have been flipping through an industrial trade magazine at the time which showed pictures of clouds that had been taken by the Air Force.

"I came up with a simple, academic storyline about the controlling of the weather. I looked up at Linwood and said, 'Let's talk about a story about preventing a disaster!'

"Linwood looked at me in a sort of strange way. He said he had never heard of a movie like that and told me to go write it. So I wrote a story from a creative point of view. I didn't just sit back and say, 'What if a big rock fell on New York?'

"I spent the next two years researching everything I could find that dealt with the weather. When I started working on the screenplay, I was able to go back to Linwood and inquire as to how to create various special effects. I'd describe the scene in a narrative and he'd break it down for me as to the technical concepts involved relative to achieving the effect physically, optically or a combination of the two. I was able to write *Weatherman* with an idea of the state of the art in mind.

"But it was a strange experience. I'd be sitting there at my typewriter and I'd get stuck in the middle of a scene. I'd close my eyes and sit back and try to think like a camera. Then, while thinking like a camera, I'd start making these sounds. I would sit there and go 'SSSshhhh' and 'WWwwwoshhh.' Then I'd open my eyes and my wife would be standing there looking at me. 'What's going on in here?' 'Uh, I'm trying to compose.'

Shortly after the screenplay was completed, Chavez linked up with Sutherland and Thompson and the great *Weatherman* push was on. After being turned down by a number of studios, the trio decided to finance the movie through independent means. Now the same studios that turned them down are calling and asking about the project. At long last, Chavez is about to see his SF dream become a reality, a prospect which delights him. "I'm looking forward to the day I can walk into a studio when the shooting starts and just go around and touch the sets and touch the actors and see the rushes. It's incredible. I can't think of any other experience like this. I can't imagine anyone not being

satisfied with all this!"

What about *Weatherman*'s audience? Will the movie have enough impact to keep them satisfied? "Well, I can't tell you too much about the plot," Chavez says, "but I can tell you that it's a very special film. It's a positive statement. It's not a disaster film about tornadoes going wild or that sort of thing. We will have our share of special effects about controlling the weather, but it's a story about working with the environment, not against it."

"The *Weatherman* is a man. He's a mortal. He doesn't have a cape with a 'W' on it. *Weatherman* is a rank. It's like a colonel . . . general . . . *Weatherman*. Only it's not like you can be a *Weatherman* with two stars or five stars. There is just one *Weatherman*. What we have projected in the story is based upon what we understand of today's technology. It's a natural extension of what we know today. It's about controlling the weather in the future, maybe 75 or 100 years from now."

"But we also deal with the politics involved in this control, the morality involved. It's also about the effect that weather control has on the hundreds of millions of people on Earth. It's a look at a world where we no longer have to depend on gold or precious gems as an economic basis for a balance of trade. I have envisioned a world where the entire economy is based upon units of water."

"When you talk about the distribution of water in *Weatherman*, you're talking about the pushing of cash all over the world. Once you push water into areas of the world that have never been cultivated, you're talking about increasing crop production and food relative to the balance of trade; you're talking about changing the population of the region. You see, the *Weatherman* is an important fellow."

Chavez catches himself in mid-sentence and forces his boyishly round face into a grin. Has he said too much? Will he say more? He looks to producer Lyn Thompson for advice. She only smiles. "I don't like *not* being able to talk," Chavez shrugs. "But . . . the *look* of the film is a secret. We have to deliver something *totally* special because *Weatherman* is *not* just another science-fiction movie. I wanted to create a science-fact story. 'Science fiction' and 'science fantasy' are terms that are rapidly becoming clichés in the movie industry because of the onslaught of SF films today. We decided that an accurate description of *Weatherman* would be a 'futuristic science drama.'

"But one that's a positive statement," adds Thompson in a conspiratorial tone.

"Oh yeah," Chavez laughs. "I'm very positive about the future. This isn't going to be 1984! My *Weatherman* works with the ecological harmony of the world. Work against it and you have an Irwin Allen disaster film."

The real question concerning space industrialization is not *if*; it is *when*. The answer to that question is, right now—if we want to do it . . .

* * *

A little more than twenty years ago, the Astronomer Royal of Great Britain, Richard Woolley (now Sir Richard Wooley), gave a speech to the Cambridge University Astronomical Society. After it, he made this rather peculiar statement: "I will be happy to answer astronomical questions on any subject with two exceptions. The other subject is the expansion of the Universe, about which I know nothing."

Everybody in the audience laughed. We knew just what he was getting at. You see, a few months earlier Woolley had made a statement that was widely reported in the newspapers: "Space travel is utter bilge."

Woolley is a respected astronomer and astrophysicist, but there is a fair chance that he will go down in history mainly as the Astronomer Royal who made that curiously ill-timed remark. Later in that same year Sputnik was launched (in October 1957) and the Space Age was born.

Since then we have seen a remarkable stream of successes: Yuri Gagarin and the first manned space vehicle, the Mercury and Gemini programs, weather satellites, the Lunar Orbiter, communications satellites, the Apollo Program and the lunar landings, Earth resources satellites, Skylab, Pioneer, the Apollo-Soyuz hook-up, the Viking landings on Mars—the list is astonishing. And with the arrival of the reusable space shuttle, more is certainly on the way. Surely, with such a list of accomplishments, no one would take a lead from Sir Richard Woolley and dispute either the scientific or the practical value of an ambitious, well-funded space program.

Or would they?

Unfortunately, they would. For example, Senator Proxmire has dismissed proposals for industrial space colonies and solar power satellites as ridiculous and impossible dreams that deserve not one cent of public funds. Although the right funding route may be through private industry, not government, I feel that he is terribly and totally wrong about the value of the basic ideas.

I'm not alone in my views. Sitting on my table here are two fat, black-bound volumes. They were published this year by the American Astronautical Society, and they contain ninety-odd scientific papers and over eleven hundred pages, all devoted to the Industrialization of Space. The most impressive thing about these volumes is their practicality—they address applications that can be achieved with *present*

technology, or very slight and reasonable extensions of it. Most of them build on the availability of the space shuttle, due for its first test next year and intended to be the workhorse of the U.S. space program for at least the next decade. Look at some of the subjects that are covered:

- solar power satellites
- solar electric propulsion systems
- space manufacturing, of everything from turbine blades to integrated circuits, from pharmaceutical products to solar cells
- applications satellites (for weather, communications and Earth resources) that can be repaired and serviced in orbit
- nuclear-powered space freighters
- space-borne nuclear reactors, transmitting power back to Earth as microwave energy

generation. For one thing, some of these projects will be very expensive, at least compared with our present budgets for space work. On the other hand, perhaps it's time to take a closer look at how we spend our federal tax dollars.

For instance, the U.S. budget for government expenditures runs about \$500 billion a year. Of that, about fifty percent, or \$250 billion, goes for "human programs" and roughly twenty-five percent (\$125 billion) for defense. Space, as represented by NASA's budget, gets about \$4.3 billion—well below one percent of the total. It is somewhat ironic that, of all the major programs undertaken by the U.S. government in the past twenty years, only one—the space program—can be regarded as a success. The others—the war on crime, the war on drugs, Vietnam, the vast expenditures on welfare, education, health

Industry In Space



Sheffield

Dr. Charles Sheffield may be a new name in the science-fiction world (his first stories were published in Galaxy two years ago), but he is a scientist of recognized stature. Born and educated in England, Dr. Sheffield holds a masters degree in mathematics and a doctorate in theoretical physics. His involvement with the space program began in 1963 and has continued ever since. Dr. Sheffield is a vice president of Earthsat Corporation, a private concern analyzing Landsat data. His first science-fiction novel, *Sight of Proteus*, an idea-packed tale of human form change and space travel, was published this fall by Ace Books.

- permanent space habitats
- space mining from both lunar and asteroidal materials.

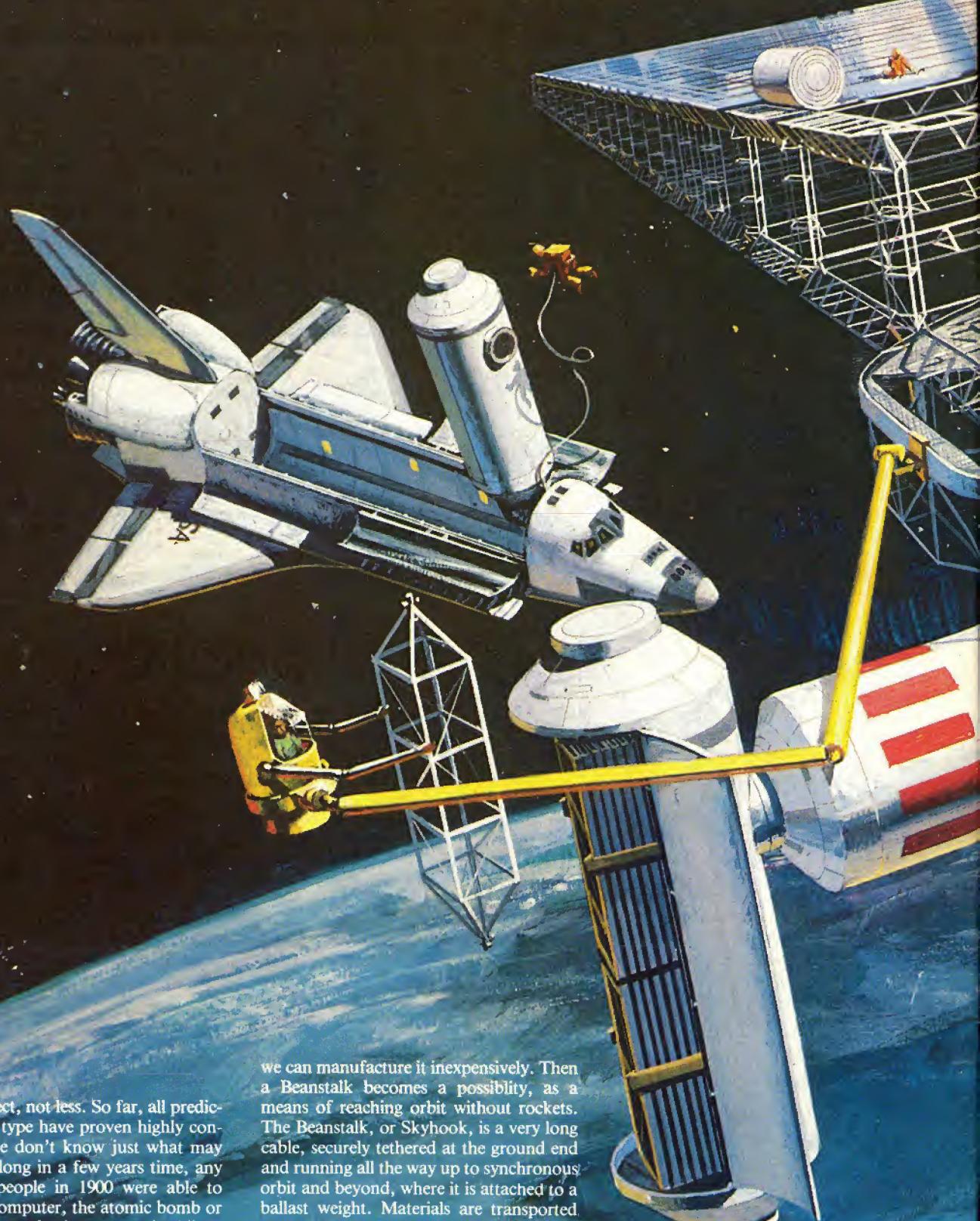
This may sound like a wild list, composed by some far-out lunatic fringe group. Not so. The papers were presented by the good, solid engineering community, from companies that created our present technological base: Boeing, General Electric, Lockheed, Grumman, Hewlett-Packard, TRW, Ford, General Dynamics, Martin Marietta, Rockwell and Comsat. They were backed by the theoretical and analytical resources of MIT, Stanford, Princeton, Penn State and many other universities, and of course by NASA. Detailed calculations were behind every conclusion and supported every suggestion on the list of applications.

Now, it's not likely that we can tackle all the new ideas for space industry in one

care and energy—have been failures to varying degrees.

Perhaps it doesn't pay to succeed. Admittedly, it may be easier to achieve technical goals than social ones. But then, why not spend our money doing the things we know how to do *successfully*, while we are still learning how to tackle the ones we don't understand? In any case, I don't regard space development, in the long run, as any less important than the other activities that absorb huge fractions of the federal budget without apparent results.

It is also most unlikely that we will have to perform space industrialization with no more than our present technology, although if we must, we can manage without new inventions. That is a great tribute to our present industrial know-how, but it's also a safe bet that in the future we'll have *more* new technology



than we expect, not less. So far, all predictions of this type have proven highly conservative. We don't know just what may be coming along in a few years time, any more than people in 1900 were able to predict the computer, the atomic bomb or a global communications network. All we know is that we'll have *something* new, and whatever it is will help us to achieve our technical goals faster or cheaper. And, just possibly, it may transform the situation beyond all recognition.

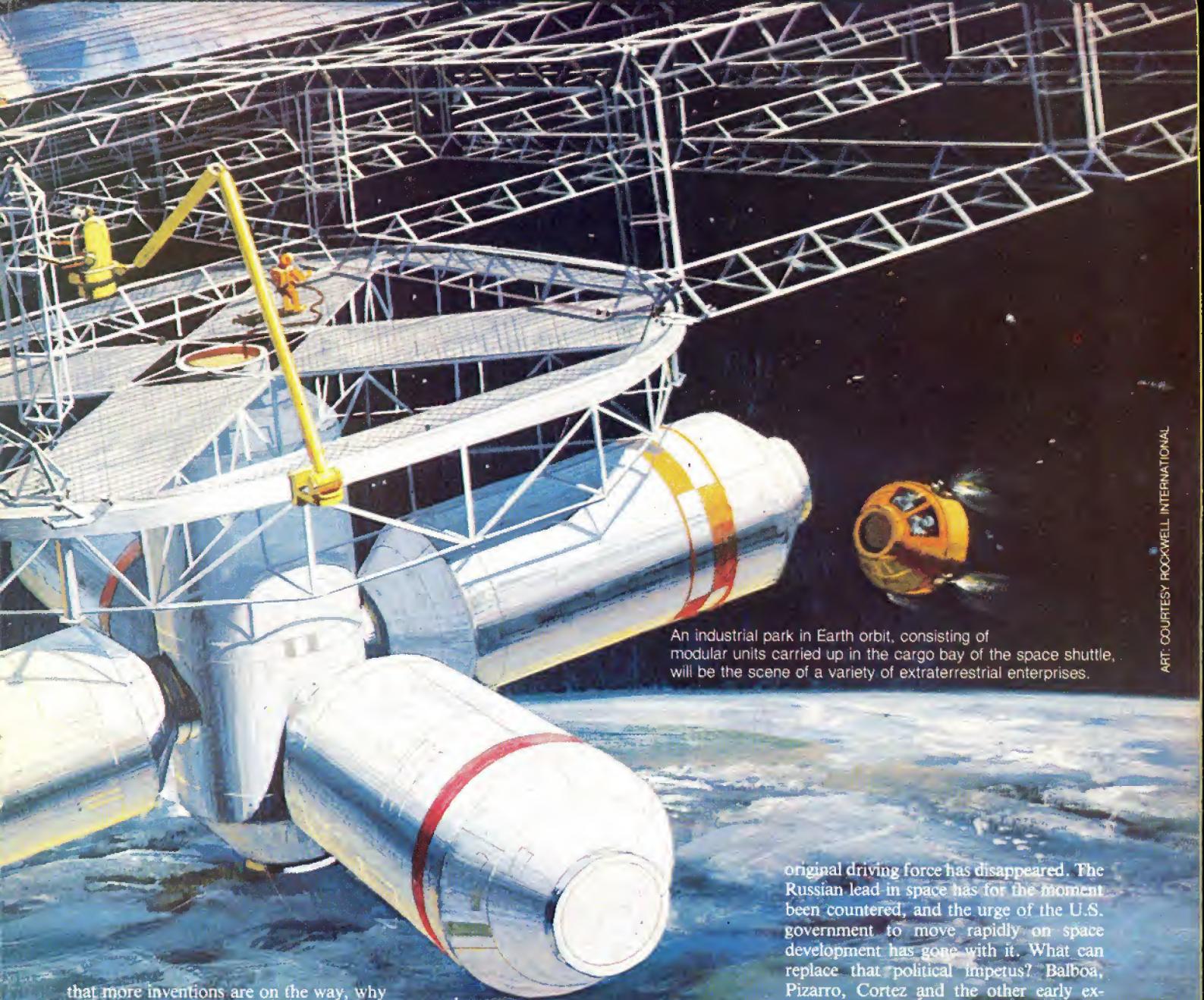
Let's take just one example that would be a "far-out" piece of technological development. Suppose that in the next twenty years a material is developed that has ten times the tensile strength of anything available now, and suppose that

we can manufacture it inexpensively. Then a Beanstalk becomes a possibility, as a means of reaching orbit without rockets. The Beanstalk, or Skyhook, is a very long cable, securely tethered at the ground end and running all the way up to synchronous orbit and beyond, where it is attached to a ballast weight. Materials are transported up and down it by a Jacob's Ladder arrangement—an endless bucket chain. Not a rocket in sight.

Implausible? Certainly. But imagine yourself in San Francisco Bay a few hundred years ago, trying to convince a Spanish navigator that somebody would one day build the Golden Gate Bridge, with a main span of nearly a mile—and that thousands and thousands of carriages, without horses, would cross it every day just to get people to their place of work.

You wouldn't be able to explain to him how it would be done—the words didn't exist in his language at that time. Closer to the present, try to explain computer program de-bugging to your great grandfather. Make no mistake about it, something will come along in the next fifty years that is at least as improbable as the Beanstalk.

If we can do so much with the means available to us today, and if we are sure



An industrial park in Earth orbit, consisting of modular units carried up in the cargo bay of the space shuttle, will be the scene of a variety of extraterrestrial enterprises.

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that more inventions are on the way, why aren't we pressing ahead? Why aren't we hard at work on solar power satellites or the first lunar bases?

This is the most interesting question of all. It involves *motivation*. Space, as a natural home for industry, ought to solve most of the problems that plague us here on Earth. There is an inexhaustible energy source (the Sun) and plenty of raw materials. The difficulty in disposing of waste (including radioactive waste) is minimal. The idea of moving segments of our manufacturing industry to space as soon as possible should be attractive to everyone. Yet, after a tremendously active twenty years, the U.S. space program is faltering and declining, forced to operate on a limited budget that is being eaten away by inflation.

To see the reason for this it's instructive to examine the earlier "expansion periods" of the human race, when the High Frontier was the unknown land beyond the seas, rather than the space above our heads. What is there to be learned

from the Vikings, or from the Portuguese and Spanish navigators?

The motives of the Vikings are a little mysterious, and not well documented. They seem to have been driven by an urge to get away from their womenfolk now and then, plus a desire to indulge in a little rape, pillage and arson in foreign parts. The Spanish and Portuguese, on the other hand, had motives that we can easily recognize and relate to: *religious zeal* and *financial zeal*.

Religious zeal may seem at first sight far from our modern interests, until we realize that the religious wars of the fifteenth century have been replaced by the *ideological* wars of the twentieth.

Proof of this? Ask yourself one question: would Neil Armstrong have walked on the Moon in 1969 if Sputnik had not flown in 1957? The main impetus of the U.S. space program for at least its first twelve years was provided by a desire to "beat the Russians" into space.

More recently (since 1969, in fact) that

original driving force has disappeared. The Russian lead in space has for the moment been countered, and the urge of the U.S. government to move rapidly on space development has gone with it. What can replace that political impetus? Balboa, Pizarro, Cortez and the other early explorers could answer that for us. We need financial *zeal*, the equivalent of the treasures of the Incas, Aztecs and Mayans. In modern terms, we must make space exploration show a profit.

That's where industry comes in. When the thrust was ideology, industry couldn't have more than a supporting role. Only a large government could afford to carry on a space program that had as its main objective a victory in the cold war. Call that the first stage. Industry will come into its own when the second stage ignites and the thrust becomes financial, based on production objectives and serving a market need.

Several factors suggest that we are at that crossroads now between the first and second stage, where the U.S. policy towards space changes from *religious zeal* to business. First, NASA is more and more emphasizing applications, looking for down-to-Earth uses for its satellites.

(continued on page 55)

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—perspectives—

This, the seventh issue of FUTURE, is the most exciting one we've put together yet. There are several firsts for the magazine this issue, starting with the front cover. For the first time FUTURE has delved into that part of the science-fiction genre that serves up the future for our daily perusal with breakfast, the SF newspaper strip. And the *Star Hawks* are certainly as up to the task of dishing it out as was their granddaddy in the field, *Buck Rogers*.

Buck Rogers has become a part of our culture and our language over the years, and the strip will soon celebrate its *fiftieth* anniversary. But the spirit of *Buck* has meant more to generations of Americans than just a few catch phrases. In the preface to *The Collected Works of Buck Rogers in the 25th Century*, editor Robert C. Dille writes: "This book records the unique story of how a comic strip became an inspiration to youth. For the most part, its message told youth of all ages that the opportunities of the future are boundless, that science beats superstition, and that education can make all things possible."

We believe that *Star Hawks* follows in that same grand tradition, ably produced by the facile mind of one of SF's mad genii, Ron Goulart, and the skilled hands of one of the comics world's finest artists, Gil Kane. Barely a year old, the strip has already been recognized with national awards and a growing international following. If your local paper doesn't carry *Star Hawks*, write in and ask them to — why miss out on all the fun?

Another first this issue is the "Careers in Space" article, included in response to the many requests we've received from young people asking how they can become a part of the opening of "the final frontier." Feature articles on a wide variety of aerospace career opportunities will be appearing from time to time, keeping you informed as to how you can get involved.

And speaking about getting involved . . . By far the most exciting first in this issue of FUTURE is the announcement of our "Getaway Special" contest. FUTURE is the first magazine ever to offer its readers the chance to bypass the educational, governmental and military bureaucracies and contribute directly to the space effort and the general body of world knowledge. By designing the best experiment package within the prescribed limitations (see page 56), some lucky reader(s) will win this chance of a lifetime. And remember, the design does not have to be the work of one person — team up with your friends, classmates, teachers or associates.

Simplicity and ingenuity may well be decisive factors in arriving at a suitable entry. As simple an instrument as a Geiger counter was responsible for the first major discovery off-planet, the Van Allen Radiation Belts. Dr. Van Allen was told at the last minute that America's first satellite, the Explorer, had room for one more small, lightweight experiment. He decided to include a Geiger counter . . . and the rest is history.

Howard Zimmerman/Editor

FUTURE #8

FUTURE #8 will focus on space science and major upcoming SF films. Look for an interview with former astronaut Wally Schirra, a fascinating feature on the origin and development of planetariums, a revealing look at how satellite pictures are processed, plus articles on the computerized house of the future and a plan for reshaping the solar system called a Dyson sphere. Our SF media coverage will include the two big Christmas releases, Superman—The Movie and the new Invasion of the Body Snatchers, plus a progress report on the filming of Star Trek—The Movie and a look at the making of a space opera, The Adventures of Stella Star.

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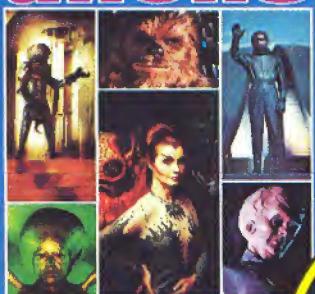
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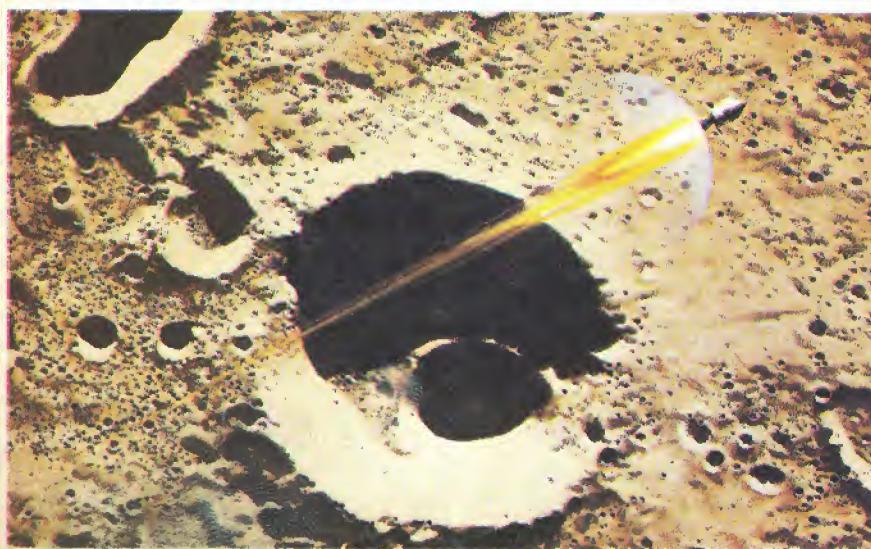
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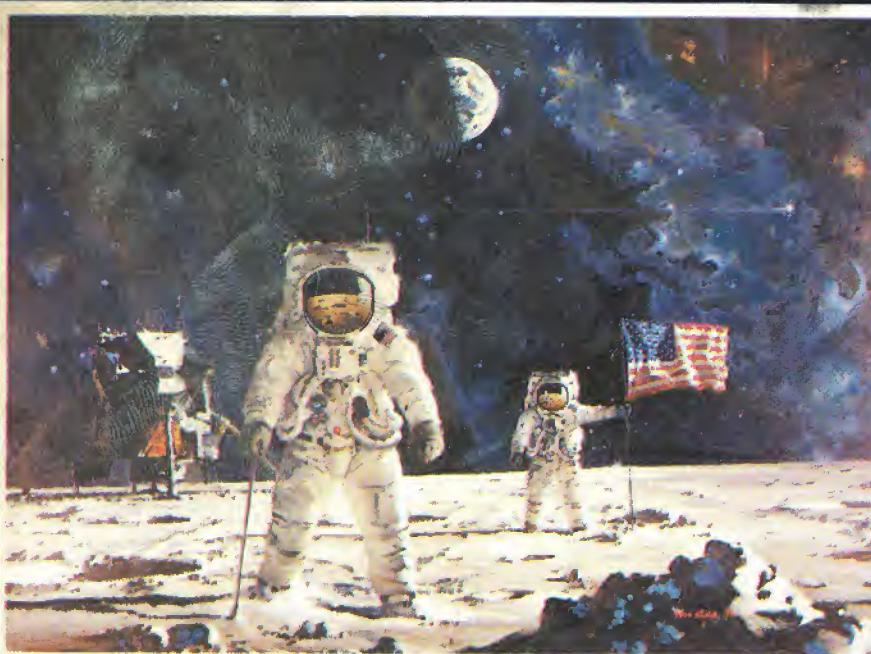
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Frequently commissioned by NASA to do on-the-spot paintings of America's ventures into space, McCall is always present for important launches and splashdowns. His oil paintings have gained international acclaim reproduced as U.S. Postage Stamps, one of which was the first stamp cancelled on the moon, and another, his most recent, commemorated the historic Apollo-Soyuz space rendezvous. McCall's work hangs in important museums, corporate offices and pri-

vate collections around the world, and he has been honored in a one-man space art show at the Smithsonian Institution.

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